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ABSTRACT

Third in a series of reports on Minnesota's Technology Demonstration Program, this document provides a synthesis of previous findings, presents a critique of the technology program, and evaluates 15 demonstration sites which were chosen to serve as models for the uses of technology in instruction and management. The report is divided into three major sections. The first section contains: (1) a brief explanation of the evaluation and data gathering methods used; (2) an overall description of the program; (3) a series of judgements about, and ratings of, the program; (4) some general observations about technology; and (5) recommendations for action. Appendices contain summary data on the projects, including their major focus, sources and amount of funding, expenditures by project and expenditure category, and a fact sheet for each site. The second section presents a summary of case study findings as well as a detailed analysis of each of the 15 programs. Comments on each program are divided into: introduction, project context, program input or resources, program implementation or process, program outcome, and synthesis/summary. The third section contains regulations developed by the Minnesota Advisory Committee on Technology in Education for school districts and the Department of Education. These relate to state funds, inservice education, availability and production of computer courseware, and criteria and procedures for evaluating courseware packages. A chart is appended which indicates the appropriate grade level specific MECC (Minnesota Educational Computing Consortium) software programs. (JB)

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TECHNOLOGY DEMONSTRATION PROGRAM

Final 1984-85 Evaluation Report

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TECHNOLOGY DEMONSTRATION PROGRAM

Final 1984-85 Evaluation Report

February 1, 1985

Diane L. Morehouse
Evaluation Section
Minnesota Department of Education

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INTRODUCTION

This is the third in a series of reports on the Technology Demonstration Program. Enacted by the 1983 Legislature, the program provides funding to a series of Technology Demonstration Sites. Each site is intended to serve as a model of the use of technology for instruction and/or management, and to provide inservice and demonstration to educators in their service area and statewide. The explicit purpose of this program is to increase awareness and widespread use of technology in school settings. The presumption is that technology can increase the availability of educational opportunities and provide necessary modernization of curricula, while reducing the necessity for school district reorganization or consolidation. Less explicit is an underlying assumption this program can increase general technological literacy.

Two previous evaluation reports have been produced. The first, dated May, 1984, was a brief overview of the progress of implementing the ten originally funded projects. The second, dated January, 1985, was a series of intensive and detailed case studies of each project, as well as an overview and analysis. This report will attempt to synthesize these findings and provide some general insights into the Technology program.

The report is organized as follows: a brief explanation of evaluation and data gathering methods, an overall description of the program, an analysis of the strengths and weaknesses of the program, a series of judgements about and ratings of the projects, some general observations about technology and recommendations. An extended appendix to this report contains overview information on each project and a variety of cost and participation data.

Readers interested in detailed information about individual Demonstration Sites are urged to carefully review the Case Studies which provide valuable insight into the operations and some of the outcomes of projects.

EVALUATION METHODS

Evaluation was conducted and/or supervised by the Evaluation Section of the Department of Education. To minimize possible concerns about objectivity, an internationally known evaluation consultant, Dr. Daniel L. Stufflebeam, was retained to assist in the design and to provide his own independent assesment of the program **and** this evaluation. Dr. Stufflebeam has produced two reports on the evaluation process and will produce a final report which will address the extent to which the process has adhered to recognized professional standards. That report will include a separate perspective on the Technology Demonstration program.

The evaluation team consisted of a Principal Investigator, the consultant, and five persons hired to conduct case studies of projects. Briefly summarized, the evaluation team conducted:

1) Advance Observations of project activities conducted shortly after the award of grants.

2) Ongoing Cost and Implementation analyses to verify operating expenses and participation information.

3) Case Studies involving staff in extensive, and detailed observations of program activities, review of documents, and indepth interviews designed to provide a comprehensive overview and description of projects.

Descriptions of each of these methods are included in the separate reports and/or are available from the Evaluation Section.

OVERVIEW OF THE TECHNOLOGY DEMONSTRATION PROGRAM

The Technology Demonstration Program is a large and complex undertaking, involving a large number of school districts (approximately 17% of all Minnesota districts), and other educational organizations in newly established consortia and in new and potentially significant change and educational reform. However, it should be noted that even the "best" projects are developmental. There are strong indications of positive outcomes attributable to the program; however projects have not been operating under state funding long enough to have established clear patterns of effects. It is fair to characterize eight of the projects as start-up; eight can be described as exemplary/completely implemented. All projects, however, continue to refine and expand.

As is true in any characterization of complex programs, there are exceptions. However, the **primary** recipients of direct services from the demonstration sites have been staff within the various consortia. Staff have been provided with awareness and overview presentations about programs and with various types of inservice. Virtually all inservice activities have been designed to assist staff to integrate technology into classroom practice. A large number of students have also been served in various ways by projects, most by exposure to and experience with the equipment and the software purchased.

Teacher involvement in programs has also included a good deal of long-range planning, assesment and curriculum development. In some cases this has resulted in new courses; in most cases it has produced changes in the way existing curriculum is and will be delivered to students. Technology can and is being used to free teachers from many repetitive tasks, allowing them to expend greater effort in other areas.

The majority of the projects have been involved in a wide variety of cooperative activities - with other school districts and with business and industry. The cooperation has taken many forms. In some cases, districts are providing cooperative inservice, in others cooperation has included long-range planning and cooperative curriculum development. Staff from the various consortia are involved to varying degrees in shared decision-making and system planning. They are also involved in new cooperative arrangements with the private sector - typically with industry providing equipment and training and the schools planning to provide instructional programming and training activities to private sector employees.

In every case, projects have made significant expenditures for equipment and software. Nearly $3 million has been spent for equipment during 1984-85. Interestingly, the majority of those funds have come from local budgets (63%). In fact, the majority of total funding for the Technology Demonstration Sites has come from the school districts themselves. Technology Demonstration Grants represent just

30% of total expenditures. While there are, again, exceptions, the majority of the hardware purchased falls into one of three categories: computers (in various configurations), television (various types), or some combination of microcomputer and broadcast technology.

OUTCOMES

A number of positive and potentially significant effects can be attributed to the Technology Demonstration Program.

The grants have clearly served as a catalyst for significant expenditures of local school district funds. The largest share of those funds have been expended for hardware (computers, printers, cameras, microphones etc.), although local funds also support staff and other associated expenses. The Technology Demonstration Grants represent just 30% of the total of site-related expenditures. Total 1984-85 expenditures for the program are $5,622,059.

These significant expenditures, particularly for hardware, have served to upgrade and modernize the instructional program in 77 school districts. In some cases, this upgrading has served to enhance already quite sophisticated equipment; in others the dollars have contributed to substantial growth in the availability of technology.

The program has also both promoted new and capitalized on existing school-business partnerships. A number of corporations and businesses - both large and small - are involved directly in the program. Industry has provided equipment, training in its use and software. Educators have in turn provided some training to private sector staff, some public relations activities and offer some potential for shared revenue generation. Several of the projects can serve as models for others of school-private sector partnerships.

For a variety of reasons, these grants have literally forced school districts and other educational institutions to cooperate with one another. This cooperation has not always been either easy or pleasant, but it is significant. The most significant aspect of this cooperation is the fact that it is cooperation for instructional improvement. In some cases, projects are doing region-wide assesment and cooperative curriculum planning and development. There have been conscientious efforts to assess the needs of smaller districts and companion efforts by larger districts to attempt to meet them. These cooperative ventures cannot help but decrease the relative isolation of schools and prove to be beneficial in the long run.

Largely because of the developmental nature of the entire program, there is little evidence that technology has produced a great expansion of courses. There is evidence, however, that the use of technology provides students and teachers with a greater choice of options within

existing curricula. Many of these options can free the teacher from the routine of drill and practice, computing and recording grades, and other routine and time-consuming tasks. The use of such tools as microvideo cameras for demonstration can allow an entire class to view more slides and cover additional content. The computer equipment in the various configurations can allow slower and gifted students to cover material at their own pace.

There are some clear indications that technology is more often being considered as an instructional tool, as a means and less often as an end. The increased availability of microcomputers means, for example, that they are now being used in courses other than science and math, and for more than teaching programming. As teachers and other staff become more familiar and comfortable with technology, they can more readily use it as an instructional aid.

It is also clear that this program has helped create more awareness of and interest in technology. This is evidenced by the numbers of visitors to sites and the numbers of requests for assistance received by project staff. Staff indicate they can perceive some changes in the type of request for information, perhaps indicating that the general level of knowledge about technology has been enhanced. Demonstration project staff have also become much more knowledgeable about the hows and whys of dissemination/demonstration. They have come to understand that demonstration activities have to be specifically targeted to the needs of those they serve. They are now producing quite a lot of informational material and manuals which can help districts adopt/adapt new programs.

As in any new program, there are also certain costs, problems and negative aspects as well. Some are caused by technology, others are the inevitable human problems associated with innovation.

Costs for these programs have been enormous and, in some cases, prohibitive. This is particularly true in the interactive television projects. Costs have been incurred not only for equipment but also for needed security measures. Costs have also been incurred because the availability of technology seems to beget increased demand. Once teachers and students become accustomed to computers, for example, they want greater access.

There have been some complaints that the level of effort devoted to staff inservice in technology has siphoned resources away from other necessary or important staff development activities. Projects have clearly occupied a great deal of staff time and attention.

There are indications that, in at least some cases, the emphasis on technology is considered by teachers as somewhat burdensome. Teachers, particularly in smaller districts, have extremely busy schedules and a limited amount of time available for inservice. Even with the large

push being given to technology, in most districts it is not the highest priority concern of the staff in terms of maintaining the school program.

The number of visitors to sites and the emphasis on demonstration has also placed some burdens on students and staff. Visitors inevitably cause dislocation in classroom routine. Visitors have also prevented project staff from solving many of the immediate problems of projects, and, in a few cases, may be contributing to staff "burn out."

Several other disruptive factors are associated with the program. The most major is the timing of the program and the necessary evaluation. Five of the projects have been funded for about six months; the remaining ten have been operating for less than one year. Nearly all have experienced some delay in the arrival of equipment; there is a general backlog due to huge national demand. Others have had to wait for the granting of necessary broadcast licenses and for construction. In most cases, these delays would not be exceedingly disruptive; in a case when final evaluation data are required in less than one year, the timing has caused some anxiety.

PROJECT RATINGS

While, as has been noted, it is difficult to conclusively document outcomes of projects, and while there are a large number of circumstances affecting the "success" of projects, there are relatively clear criteria to enable rating of projects in various ways. At the request of legislative staff and other audiences, this evaluation has provided some overall ratings of the projects.

Three criteria have been used to differentiate projects. The first is a simple measure of the extent to which projects have implemented goals, objectives, plans for the year. This criterion is called IMPLEMENTATION.

The second was a two-part judgment about the ease with which a project could be adopted or adapted in other locations and about the relative success of projects in encouraging, attracting and accepting the dissemination responsibility. Judgments in this area are somewhat affected by the level of project implementation. This criterion is called TRANSPORTABILITY.

The third criterion, POTENTIAL FOR NEW KNOWLEDGE, is a judgment about the eventual significance of projects - the potential for providing significant new knowledge about the use of technology, the extent to which projects can serve as statewide or national models, and the level of innovation inherent in projects.

These criteria were developed after conversation with program and

project staff and audiences of this evaluation. Criteria were first defined, and a two-part process implemented. Two raters reviewed each of the fifteen projects wholistically and assigned a numerical rank in each category. In the case of the IMPLEMENTATION criterion, a percentage figure was computed; each of the others was a wholistic judgment. When rankings had been assigned in each category, a set of ratings, based on the criteria, were produced. Ratings within each criterion are High, Medium, and Low. The two-step process is summarized in Table One.

The evaluator acknowledges that this evaluation and the program have had substantial constraints, that the ranking procedure involved the exercise of judgment about programs, and that as the year progresses, these rankings could change. They do, however, as of this writing provide a good summary of project accomplishments and project potential.

A number of factors are very clear from these rankings and the considerable data available for each project. First, it is very easy to differentiate between those projects at the top of the rank order and those at the bottom. It is much less easy to differentiate between other projects, most of which are not fully implemented and most of which have suffered from some delays which are absolutely beyond their scope of responsibility. Those extenuating circumstances have been described in detail in the Case Studies. Some of these factors relate specifically to technology, others are human and organizational issues.

Those projects with the highest overall rankings obviously have: 1) made significant progress in implementation, 2) have generated considerable interest and are able to provide ideas and materials to support adoption/adaptation in other locations, and 3) show great potential for producing significant new knowledge. In addition, the projects and the districts in which they are located appear to share the following:

-a history of involvement with and use of technology;
-a concrete, specific, doable plan of action,
-clear-headedness and realism about the risks and benefits of the program;
-a history of staff involvement in planning and/or decision-making;
-active outreach and a history of willingness to share experiences and practices;
-strong leadership;
-a school or school district climate that encourages risk-taking and creativity.

These characteristics of successful projects are consistent with the characteristics which have been shown to distinguish between effective and ineffective schools.

TABLE ONE

Technology Demonstration Sites
Ratings

Approximate Rank Order	Implementation Rating	Transportability Rating	Potential for New Knowledge
Exemplary			
Blue Earth BEACON	High	High	High
Cambridge ECMECC	High	High	High
Bloomington BITS	High	High	High
Anoka-Hennepin INTECH	High	High	High
Difficult to Assess			
Hopkins Demonstration Site	Medium	High	Medium
Shakopee Demonstration Site	High	High	Low
Duluth NEETC	Medium	Medium	Medium
Minneapolis Demonstration Site	Medium	Medium	Medium
Robbinsdale Technology Learning Campus	Medium	Low	Medium
Montevideo Minnesota Valley Tele-Network	Low	Medium	Medium
Austin-Rochester High Tech Cooperative	Low	Medium	Medium
St. Louis Park/Tower Soudan Demonstration Development, Dissemination	Low	Medium	Low
NW ECSU Project SMART	Medium	Low	Low
Significant Problems			
Woodland Coop Communicasting	Low	Medium	Low
Mankato/St. Peter KIDS	Low	Low	Low

GENERAL OBSERVATIONS ABOUT TECHNOLOGY IN EDUCATION

In addition to attending to the main scope of evaluation responsibilities, the team has made certain observations about the uses of technology which appear to be true across this program. With an awareness that it is often dangerous to make generalizations from a single evaluation study, the following are offered as hypotheses:

-The leadership exercised by program staff is more crucial to the successful use of high technology than the amount or the sophistication of the hardware. Simply stated, the money and the technology matters less in terms of successful operations than the people involved in a program.

-Technology will take a long time to be fully integrated into instruction. There appears to be something analagous to a learning curve operating, with the first stage being motivation; and subsequent stages involving learning and experience for students, teachers and other staff. Most schools have just begun to explore the potential of technology.

-Technology seems to breed itself. Each purchase and each use seems to create additional demand for hardware and software. Many of the people involved with this program say the schools have no choice but to provide students with high technology because the world will demand they be competent in its use. If this is true, questions of cost may not be entirely relevant.

-There seem to be two major aspects to the use of technology in instruction. The first is to provide students with some knowledge about technology as a life skill, i.e, using technology to teach about technology. The second is to use technology as an instructional tool, i.e., using technology to impart knowledge. Both appear to be necessary.

-Software remains a problem; good software is scarce, often expensive, and sometimes difficult to coordinate with text and curriculum.

-As technology enters the schools, a kind of "catch-up" process has to occur. For example, in many places, computer literacy is being written into elementary curricula and students are acquiring such skills as keyboarding rapidly. However, high school students will also need such skills, particularly as colleges and universities begin to require knowledge of word processing. This may produce a kind of discontinuity in curriculum until elementary students reach high school. Ultimately keyboarding and beginning programming classes may not be needed in secondary curriculum.

-The widespread use of technology raises some questions of equity, as

boys continue to outnumber girls in technology-related courses, and as students whose families own computers are placed in competition with students who cannot afford a computer. Other equity questions can be raised about students attending schools where significant investment has been made in technology vis a vis those coming from less fortunate backgrounds.

It is clear that teachers must have knowledge of and experience in technology before it can be used effectively with students. Moreover, it is essential to involve teachers in planning for the uses of technology if such uses are to succeed.

RECOMMENDATIONS

The following recommendations appear to be warranted:

-The evaluator strongly recommends continuation of, at minimum, the four highest ranked projects. These each have enormous potential for producing new knowledge about 1) the effects of computer assisted instruction, 2) the effects of interactive televised instruction, 3) strategies for promoting change in school districts and 4) strategies and methods for inservice instruction. This continuation should be accompanied by substantial funds for follow-up research/evaluation which would allow exploration of the extent to which these projects actually can result in significant new information.

-In the event of refunding, monies should be set aside to cover substitute costs for teachers. Travel funds alone are inadequate encouragement for teachers to visit demonstration sites.

-If projects are refunded, more realistic operating and evaluation timelines should be adopted. Projects should have a minimum of one year before final data are required. Subsequent continuation should be made contingent on evaluation findings. Evaluation findings should include both local evaluation and evaluation conducted by an independent third party. Funding for evaluation should take into consideration the size and scope of this program. The total 1984-85 evaluation budget was less than one percent of the total program budget; that clearly is inadequate.

APPENDIX ONE

SUMMARY DATA

FIGURE ONE

Technology Demonstration Project Location

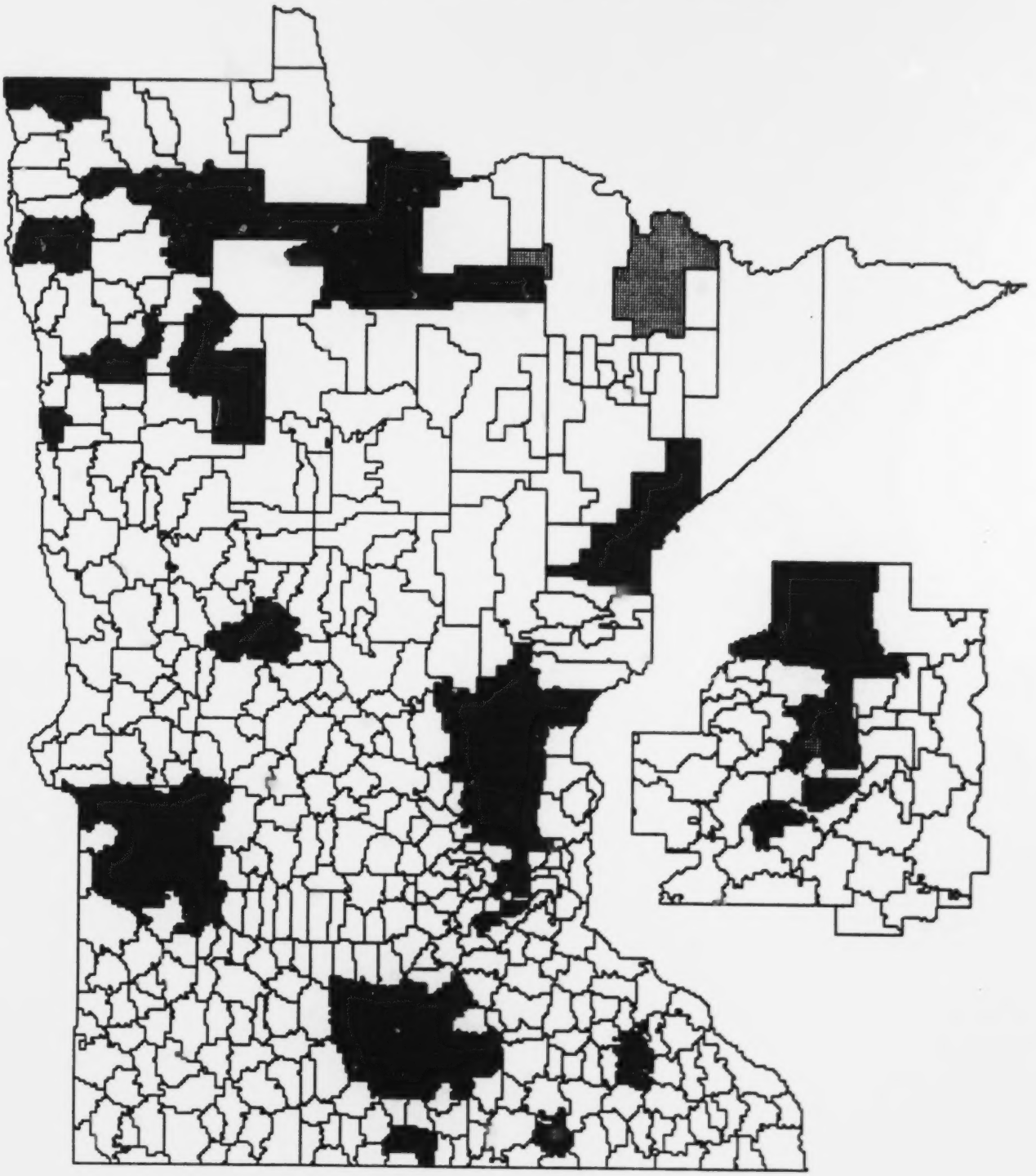

TABLE TWO

Technology Demonstration Sites
Project Summary

Fiscal Agent/ Project Title	Number of Cooperating Districts	Major Service Focus		Major Hardware Emphasis			Status		Primary Service Targets		
		Inservice	Instruction	Computers	TV	Combination	Start-Up	Exemplary	Students	Staff	Community
Bloomington BITS	1	X				X		X	X	X	
Blue Earth BEACON	1		X	X			X		X		
St. Louis Park/Tower Soudan Demonstration Development Dissemination	2	X				X		X		X	
Cambridge ECMECC	7		X		X		X		X	X	X
Austin/Rochester High Technology Coop	2	X				X		X		X	
Hopkins Demonstration Site	1	X				X		X	X	X	
Anoka-Hennepin INTECH	8	X		X			X			X	
Mankato/St. Peter KIDS	15/4		X		X		X		X		
Minneapolis Demo. Site	1	X				X		X	X	X	
Montevideo Minnesota Valley Tele-Network	9		X		X		X		X	X	
Duluth NEETC	8	X		X			X		X	X	
Shakopee Demo. Site	1		X	X				X	X		
NW ECSU SMART	16	X		X			X			X	
Robbinsdale Technology Learning Campus	1		X	X			X		X		
Woodland Coop Communicasting	4		X		X			X	X		

TABLE THREE

Technology Demonstration Sites
Sources and Amount of Funding

Sources of Funding	Total of Actual and Projected Expenditure [1]	Percent of Total
Local School Districts	$ 3,325,321	59%
Technology Demonstration Grants [2]	1,700,238	30%
Other Grants [3]	596,500	11%
TOTAL	$ 5,622,059	100%

1- Includes fiscal 1985 only.
2- Does not include $125,120 grant to KIDS which has not been spent.
3- Includes: CQE, Northwest Area Foundation, Block Grants, Special Block Grants, IBM, Honeywell, CDC, Ideal Learning Corporation, Pioneer Public Television, Apple Corporation, Team Electronics, and various software publishers.

TABLE FOUR

Technology Demonstration Sites
Expenditures by Project

Project	Source of Funds: Technology Site Grant	Other Grants	Local*	TOTAL
Bloomington BITS	$ 125,120	$ 22,338	$ 159,048	$ 306,506
Blue Earth BEACON	125,000	35,700	85,405	246,105
St. Louis Park/Tower Soudan	125,000	109,507	238,074	472,581
ECMECC	125,120	1,500	468,706	595,326
Southern Minnesota Cooperative	125,120	-	290,750	415,870
Hopkins TECH	111,865	2,000	122,980	236,845
Anoka-Hennepin INTECH	125,120	100,000	74,120	299,240
Minneapolis TDS	123,040	31,000	78,114	232,154
MN Valley Tele-Network	125,120	117,674	495,820	738,614
NEETC	125,120	135,781	308,923	569,824
NW ECSU Project SMART	125,120	-	75,131	200,251
Shakopee	121,000	20,500	58,112	199,612
Robbinsdale TLC	119,593	20,500	836,319	976,412
Woodland Coop. Communicasting	98,900	-	33,819	132,719
TOTAL	**$1,700,238**	**$596,500**	**$3,325,321**	**$5,622,059**

*Includes both cash and in-kind

TABLE FIVE

Technology Demonstration Sites
Sources of Funds/Expenditures by Category[1]

Expenditure Category	Technology Demonstration Site Grant	Other Grant[2]	Local[3]	TOTAL
Equipment	$ 601,544	$ 472,955	$1,862,368	$ 2,936,867
Professional Salaries	599,930	65,338	947,222	1,612,490
Miscellaneous[4]	91,980	10,000	320,317	422,297
Non-Professional Salaries	142,512	-	70,666	213,178
Consultants[5]	125,192	29,200	25,367	179,759
Materials and Supplies[6]	104,711	13,900	56,089	174,700
Travel[7]	34,369	5,107	43,292	82,768
TOTAL	$ 1,700,238	$ 596,500	$ 3,325,321	$ 5,622,059

1- 1984-1985 only, previous expenditures such as equipment not included
2- Includes: CQE, Northwest Area Foundation, Block Grant, Special Block Grant, IBM, Honeywell, CDC, Ideal Learning, Team Electronics, Pioneer Public Television, Apple Corporation, and various software publishers
3- Includes both cash and in-kind contributions
4- Includes all non-salary expenses for Technology Learning Campus
5- Some project staff retained as consultants
6- Includes software purchases
7- Includes stipends for teacher inservice

TABLE SIX

Technology Demonstration Sites
Participation Information

		STUDENTS	STAFF	VISITORS
Bloomington	BITS	6,831	81	387
Blue Earth	BEACON	150	29	290
St. Lois Park	Demonstration, Development Dissemination...	NA	48	202
Cambridge	ECMECC	162	38	785
Austin	High Technology Cooperative	NA	33	633
Hopkins	Technology Demonstration Site	3,114	156	310
Anoka-Hennepin	INTECH	NA	540	488
Mankato/St. Peter	KIDS	NA	36	NA
Minneapolis	Technology Demonstration Site	630	60	244
Montevideo	Minnesota Valley Tele-Network	NA	62	61
Duluth	NEETC	11,365	130	500
Shakopee	Technology Demonstration Site	2,554	156	267
NW ECSU	SMART	NA	505	NA
Robbinsdale	Technology Learning Campus	292	16	70
Woodland Coop	Communicasting	39	12	80
	TOTAL	25,137	1,902	4,317

Data provided by project staff; verified but subject to differences in interpretation.

APPENDIX TWO

PROJECT FACT SHEETS

PROJECT FACT SHEET

TITLE:	Bloomington Information Technology System (BITS)
LOCATION:	Bloomington Public Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$306,506
FUNDING SOURCES:	Local District, Block Grant, Special Block Grant, TDS Grant
DESCRIPTION:	This site can demonstrate 24 discrete uses of technology for providing, managing or supporting instruction and for school-community communication. Many of these practices have been developed by Bloomington staff; others are proven/validated practices adopted from other locations. The program is attempting to define a management process and strategy for promoting large-scale change and technological innovation in a school district.
STRENGTHS:	The Bloomington district has been involved in planning for the instructional use of high technology for some time; it also has a strong commitment to staff development, to encouraging staff creativity and to assist visitors to the district. Program staff have developed very effective dissemination/demonstration materials and a system for helping visitors. Most of the practices could be easily adopted in other locations.
WEAKNESSES:	While this project has enormous potential to provide research/evaluation insight into the effects of technology use, it has not yet begun this planned effort. The project has also not yet made explicit the strategies and techniques which are most effective in promoting change. The project will be unable to demonstrate full use of interactive cable until cable franchise negotiations in the Bloomington community are finalized.
LESSONS:	The BITS project has enormous potential for helping districts of any size plan for and implement a number of applications of technology, and in showing them how best to demonstrate technological innovations. With some serious effort this project can provide valuable documentary evidence about the most effective and cost-effective uses of instructional technology and about the management and other strategies most useful for promoting change and innovation in a school district.

PROJECT FACT SHEET

TITLE:	Business and Education Seeing Computer Technology as an Operational Necessity (BEACON)
LOCATION:	Blue Earth Public Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$246,105
FUNDING SOURCES:	Local district, TDS Grant, local industry, Follet Book Co., software publishers
DESCRIPTION:	This project is using computers to improve the writing skills of eighth graders, address speech and special education needs, develop a comprehensive resource file of media and human resources, and to implement a unique fourth grade computer classroom which serves 26 students. Each student in the computer classroom has an individual education plan (IEP), and his/her own computer. The computer is used approximately 50% of the school day with software which supports the established curiculum. The district can also demonstrate a well-established school-business partnership.
STRENGTHS:	This is a small school district which has been actively involved in use of computer technology for some time; it is also a district which is willing to take risks and support innovation. The method by which the computer classroom has been organized and implemented will permit the conduct of potentially significant long-term research on the effects of computer assisted instruction. This project can also demonstrate a unique example of a school and local business community partnership. The enthusiasm and commitment of BEACON's staff is obvious.
WEAKNESSES:	A few isolated concerns have been raised about the computer classroom - 1) whether students receive sufficient personal (human) attention, and 2) what will happen to the students when they return to a more traditional classroom setting. The number of visitors to the classroom causes some evident disruption.
LESSONS:	This project may ultimately provide educationally significant data on the long-term academic and social effects of computer assisted instruction. This district provides instructive lessons in risk-taking and staff-suported creativity. It may also serve as a model for mutually beneficial school-business partnerships.

PROJECT FACT SHEET

TITLE:	Demonstration, Development, Dissemination: Three Dimensions of Technology Transfer
LOCATION:	St. Louis Park and Tower-Soudan Public Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$472,581
FUNDING SOURCES:	Local districts, Apple Corporation, Block Grant, CQE, TDS Grant, Technology Inservice
DESCRIPTION:	This project was designed to demonstrate a variety of existing uses of technology in two distinctly different settings - a large urban district and a small outstate district. It has three basic goals: dissemination of technological practices to other school districts, development/revision of curricula in science, social studies and reading to incorporate technology, and staff training.
STRENGTHS:	Both cooperating school districts have been involved in the use of technology for some time and both can demonstrate a variety of excellent uses of technology. The project has implemented a number of major inservice education activities, both for K-12 and community education. Cooperation among the two districts has been slow. However, if implemented fully the project could demonstrate the benefits of cooperation among small and large, urban and rural schools.
WEAKNESSES:	The project has not been particularly aggressive in its demonstration efforts, assuming that the designation of the schools as a demonstration site would bring large numbers of visitors. This has basically not occurred. Efforts are now being made to encourage visitors. Curriculum development is part of ongoing processes in St. Louis Park, and thus far the technology component is incomplete. Cooperation between the two districts has been somewhat slow, although more efforts are also being made in this area.
LESSONS:	This project is an example of some of the difficulties associated with demonstration; outreach and aggressive publicity seem to be required, as do efforts to provide materials and strategies to help visitors understand and use the practices available for demonstration. This project is also an example of how difficult cooperation among school districts can be. With serious effort devoted to improving that cooperation, this project might be able to demonstrate shared services between remote, rural districts and urban districts through high technology.

PROJECT FACT SHEET

TITLE:	East Central Minnesota Educational Cable Cooperative (ECMECC)
LOCATION:	Cambridge - Isanti Public Schools
OTHER PARTICIPANTS:	Braham, Milaca, Mora, Pine, Princeton, (Ogilvie)
TOTAL 1984-85 FUNDING:	$595,326
FUNDING SOURCES:	Local districts, CQE, TDS Grant
DESCRIPTION:	This is a consortium of seven school districts, working in partnership with a private cable television company to provide interactive television instruction. This system began operating in the fall of 1984. So far, six new classes are available to over 100 students via the two-way system. It is also used for community education and for rapid communication between the member districts The TDS grant also provides for the improvement of the consortium's microcomputer use and for demonstration of the instructional uses of satellite programming.
STRENGTHS:	This project has been in the planning stages for several years, something which virtually all participants believe is essential for interactive television. The project has been extremely well planned; cooperation among the consortium is taken very seriously and cooperation is described as phenomenal. The staff have also made concerted attempts to inform and involve teachers, and to insure they have sufficient training to feel comfortable with the interactive system. This project is an excellent example of a partnership between schools and a cable franchise holder. The project has much that can be shared with other districts investigating the potential of instructional television.
WEAKNESSES:	The ECMECC program has been enormously expensive, requiring significant capitol outlay and a cooperative aid levy. The project, while very successful, has only been in operation for a few months and has experienced some quite typical problems. The number of visitors and requests for information have hampered the staff in their attempts to solve them.
LESSONS:	The ECMECC project is an excellent example of the kind of long-range needs assessment and planning which appears to be vitally necessary for a project of this scope. It is also an excellent example of the necessity to involve teachers in planning and the need for high quality inservice and curriculum planning. The volume of interest in this project undoubtedly indicates the level of interest statewide in interactive telecommunications.

PROJECT FACT SHEET

TITLE:	High Technology Cooperative Model for Southern Minnesota
LOCATION:	Austin and Rochester Public Schools
OTHER PARTICIPANTS:	Twenty-five area districts, visitors
TOTAL 1984-85 FUNDING:	$415,870
FUNDING SOURCES:	Local district, TDS Grant, IBM
DESCRIPTION:	The project was designed to improve and interconnect the computer and cable technology of Rochester with the telecommunications and computer resources of Austin. Also to be served were other school districts in southern Minnesota. Funds have been used to remodel and update computer labs and to acquire software.
STRENGTHS:	The site can demonstrate an excellent public broadcast facility with a strong commitment to instruction. It can also demonstrate a variety of computer lab configurations and uses.
WEAKNESSES:	The project has had some difficulty - both in communication between the two districts, and in providing inservice to area schools. The original inservice plan did not appear to meet the needs of area districts, and the inservice delivery method was not considered appropriate. The staff has made substantial efforts to improve inservice and are now meeting with greater success. The microwave link between Austin and Rochester awaits completion of a new tower.
LESSONS:	Perceptions about school district size and training needs can mediate the success of cooperative inservice. Larger school districts cannot simply assume they understand the inservice needs of smaller districts; needs and programs should be cooperatively defined.

PROJECT FACT SHEET

TITLE:	Technology Education Center/Demonstration Site
LOCATION:	Hopkins Public Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$236,845
FUNDING SOURCES:	Local district, TDS, National Diffusion Network
DESCRIPTION:	The Hopkins site has adopted and is demonstrating its locally developed Mastery Management System. Also, part of the project are efforts to develop a model for teaching higher level thinking skills, major inservice, provision of software and a series of video tapes on natural events filmed at Carver Park Nature Center. Statewide inservice and demonstration is also a major focus.
STRENGTHS:	The district is well known for its nationally validated CAM system; the Mastery Management System in reading has been implemented and evaluation data are positive. While other activities are not yet complete, it is likely a teaching model, inservice and provisions for software evaluation to address higher level thinking skills could be of great value to other districts. The project has much that will be useful and easily transportable to other districts.
WEAKNESSES:	The Hopkins program has been somewhat hampered in its progress by delays in funding. The district's heavy use of committees also tends to slow progress.
LESSONS:	This district can demonstrate excellent and precise evaluation and refinement of programs, such useful pilot testing has produced exemplary products. This program can also demonstrate the value of teacher involvement in program development.

PROJECT FACT SHEET

TITLE:	Innovative Inservice for Integrating Technology in Classrooms (INTECH)
LOCATION:	Anoka-Hennepin Public Schools
OTHER PARTICIPANTS:	Brooklyn Center, Centennial, Columbia Heights, Elk River, Fridley, St. Francis, Spring Lake Park, Anoka-Ramsey Community College, Anoka AVTI
TOTAL 1984-85 FUNDING:	$299,240
FUNDING SOURCES:	Local districts, TDS Grant, IBM
DESCRIPTION:	This consortium of eight districts is organized to provide inservice to encourage the widespread adoption of technology. It relies on a network of teachers who provide training to their colleagues. The project can demonstrate several computer labs and a mobile demonstration facility, all used for inservice.
STRENGTHS:	This project is an excellent example of an inservice delivery model which uses the considerable expertise of existing staff and which is designed to be accessible and convenient. The program has also been extensively involved in demonstration activities.
WEAKNESSES:	The program is large and complex and requires additional staff to meet its objectives. The program has just begun to link up with the training needs of area industries.
LESSONS:	The INTECH program can demonstrate an excellent model for inservice delivery and for creating awareness of technology. The program can also aid in the widespread demonstration of technology with its mobile demonstration facility which appears to be an efficient and cost-effective method.

PROJECT FACT SHEET

TITLE:	Knowledge Interactive Distribution System (KIDS)
LOCATION:	Mankato/St. Peter
OTHER PARTICIPANTS:	Amboy-Good Thunder, Cleveland, Garden City, Janesville, Lake Crystal, LeCenter, Madelia, Mapleton, New Ulm, Nicollet, St. Clair, Waldorf-Pemberton, Mankato State University, University of Minnesota-Waseca, SC ECSU, Mankato AVTI, SMILE
TOTAL 1984-85 FUNDING:	
FUNDING SOURCES:	Local districts, Mankato State University
DESCRIPTION:	This program intended to plan for, construct and implement an interactive television network to serve K-12, community education and inservice needs. The original construction bid was prohibitively expensive and was rejected. The consortium then sought and received permission to reduce to four members: Cleveland, LeCenter, Nicollet and St. Peter. The four remaining KIDS members are at present unable to agree on a mechanism for sharing costs and providing service.
STRENGTHS:	The lessons learned by the KIDS Consortium can benefit others contemplating interactive television. The experience has aided the member schools in learning about technology and in becoming better acquainted with one another.
WEAKNESSES:	This consortium was too large to cost-effectively implement interactive television. Moreover, the evaluators believe the members failed to adequately consider instructional needs and this is, in part, responsible for the present failure to agree on operating and funding plans.
LESSONS:	Interactive television systems are extremely costly, and the cooperative arrangements difficult. Systems musts be carefully planned, be of manageable size and designed to meet important educational needs. Systems also require considerable start-up-time.

PROJECT FACT SHEET

TITLE:	Minneapolis Technology Demonstration Site
LOCATION:	Minneapolis North and Edison High Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$232,154
FUNDING SOURCES:	TDS Grant, Honeywell, local funds
DESCRIPTION:	The program has two central purposes: to demonstrate the district's extensive uses of technology, and to provide inservice and curriculum development leading to the improvement of five magnet programs.
STRENGTHS:	The district has been heavily involved in technology and can demonstrate many unique uses of advanced technology. Efforts now underway to better define these uses and to recruit visitors may prove useful in helping smaller districts adopt these uses to their own situations. New courses have been developed within the district and there are indications the project has encouraged the sharing of resources among magnet programs.
WEAKNESSES:	The program has been somewhat slow in getting started. It is also large and complex and somewhat difficult to demonstrate easily. Better targeting of program components to the needs of visitors will aid demonstration efforts.
LESSONS:	Large and expensive uses of technology can provide lessons to smaller districts; however, effective demonstration requires efforts to help other districts adopt very sophisticated technology to their own situation.

PROJECT FACT SHEET

TITLE:	Minnesota Valley Tele-Network
LOCATION:	Montevideo
OTHER PARTICIPANTS:	Appleton, Benson, Dawson-Boyd, Granite Falls, Madison, Maynard, Milan, Ortonville, SW-WC ECSU, Southwest State University.
TOTAL 1984-85 FUNDING:	$738,614
FUNDING SOURCES:	Local funds, TDS Grant, Pioneer Public Television
DESCRIPTION:	Working in cooperation with Pioneeer Public Television, the project has been planning for and is now constructing on interactive television network. The system will be used for K-12 instruction, community and adult education, and for inservice offerings. FCC licenses have been granted and the latest information indicates the system will be operating by March 1, 1985.
STRENGTHS:	The Tele-Network project has been extremely well planned and cooperation is excellent. The relationship between this consortium and a public broadcast network might serve as a model for cost-saving and revenue generation for districts in other areas served by public or private TV stations. The broad range of constituencies to be served by this project is unique.
WEAKNESSES:	The costs, licensing and complexity of this system has delayed its start-up. Claims about operating efficiency or effectiveness cannot be made.
LESSONS:	Interactive television system are very complex and very costly. It will take several years for this and/or other interactive systems to prove their viability. This project could serve as a model for cooperative planning and curriculum development. It also provides an interesting model for school-business partnerships.

PROJECT FACT SHEET

TITLE:	Northeast Educational Technology Consortium (NEETC)
LOCATION:	Duluth Public Schools
OTHER PARTICIPANTS:	Barnum, Carlton, Cloquet, Esko, Hermantown, Proctor, Wrenshall, Visitors
TOTAL 1984-85 FUNDING:	$569,824
FUNDING SOURCES:	Local districts, Control Data Corporation, TDS grant, Team Electronics
DESCRIPTION:	The NEETC Consortium of eight schools, in cooperation with CDC, is designed to provide schools with hardware and inservice instruction and, ultimately, to provide improved instruction for students. Extensive hardware and software has been purchased. Computer labs are now operating in all secondary schools, and all secondary students will receive some training.
STRENGTHS:	The grant has served as a catalyst for much local expenditure for needed equipment, and for a partnership with CDC. Staff have received training, and the consortium schools are more able to provide experiences in and with technology for students. Cooperation among consortium members has been excellent.
WEAKNESSES:	Software quality is an issue; good software is scarce, expensive and difficult to coordinate with text and curriculum. The project has been expensive, and has created demand for even more hardware and software. The project has been operating such a short time that student impact, thus far, has been minimal.
LESSONS:	As computer technology enters the schools, a "catch up" process has to occur. Elementary curricula includes computer literacy, but upper level students need this too. The availability of hardware and software in school seems to beget increased demand. Staff here believe students **must** have exposure to high technology as a survival skill. If this is true, questions of cost-effectiveness may not be relevant.

PROJECT FACT SHEET

TITLE:	Shakopee Technology Demonstration Site
LOCATION:	Shakopee Public Schools
OTHER PARTICIPANTS:	Cooperative Area Learning Center, Women's Correctional facility
TOTAL 1984-85 FUNDING:	$199,612
FUNDING SOURCES:	TDS grant, Local funds, Ideal Learning Corporation
DESCRIPTION:	The Shakopee site is a demonstration of Local Area Networking, systems for interconnecting microcomputers, and of extensive use of compatible courseware for instruction. The LAN has been used extensively in the district for mathematics instruction and word processing, and new curriculum areas are being added. The grant has allowed expansion of the networking system to three elementary schools, the Cooperative Area Learning Center, and the Women's Correctional Facility.
STRENGTHS:	The project can demonstrate its considerable success in use of a computer network for instruction. It has allowed the district to offer otherwise unavailable courses and to allow automated record-keeping and grade management. The system has proved very effective for absentee students. Elementary and other staff have received inservice training.
WEAKNESSES:	There are general concerns about optimal uses of this type of instruction and about software quality - the level of difficulty of math courseware, for example. Better pilot-testing of material is recommended.
LESSONS:	Software quality appears to be an issue affecting many sites. This project can demonstrate uses of technology which could allow smaller schools to offer courses which might not otherwise be available.

PROJECT FACT SHEET

TITLE:	Subject Matter Awareness: Implementation of Resourses Through Technology (SMART)
LOCATION:	NW ECSU
OTHER PARTICIPANTS:	Alvarado, Bagley, Erskine, Fertile, Fosston, Gonvick, Goodridge, Grygla, Hendrum, Humbolt, Kelliher, Lancaster, Middle River, South Koochiching, Strandquist
TOTAL 1984-85 FUNDING:	$200,251
FUNDING SOURCES:	TDS Grant, local funds
DESCRIPTION:	SMART is a cooperative effort of the ECSU and 16 school districts. It hopes to demonstrate that small, rural districts can use existing equipment and staff expertise to expand technology use. The inservice emphasis is provided by a cadre of Subject Matter Specialists who are to provide inservice and other assistance to their colleagues.
STRENGTHS:	The use of existing personnel for "turnkey" inservice has been shown to be an excellent delivery device. Staff are extremely willing to make necessary modifications in program approach.
WEAKNESSES:	Local inservice has not been very successful. Subject Specialists were first concerned about their own training; they have been subsequently hampered by general resistance from staff and, in some cases, a shortage of equipment. Distance between districts is also a problem.
LESSONS:	Most teachers, particularly in small schools, have multiple commitments and responsibilities. It is also often difficult to free them for inservice. It may take time, particularly in remote locations, to overcome resistance and to develop effective training mechanisms.

PROJECT FACT SHEET

TITLE:	Technology Learning Campus (TLC)
LOCATION:	Robbinsdale Public Schools
OTHER PARTICIPANTS:	Visitors
TOTAL 1984-85 FUNDING:	$972,412
FUNDING SOURCES:	Local funds, TDS Grant, Northwest Area Foundation, Honeywell
DESCRIPTION:	This is a brand new alternative school in the Robbinsdale district, designed to serve students in grades 6, 7 and 8. Technology is the focus; the real purpose is the provision of alternatives. The school opened its doors to 292 students in the fall of 1984. The student population represents a mix of background and achievement level.
STRENGTHS:	This extremely ambitious project has experienced considerable success in meeting its objectives to plan, staff, equip and open a new school. Response from parents has been largely favorable and the administration is very committed to the success of the program.
WEAKNESSES:	As a new school, TLC has been hampered by delays in preparing the facility, a shortage of equipment, and staff and curriculum development needs. There are indications that the pressures imposed by the TDS grant have caused the staff to implement the program too quickly.
LESSONS:	This is a very ambitious effort. Like all innovations and all new schools, it will take a considerable effort and much time before outcomes can be demonstrated.

PROJECT FACT SHEET

TITLE:	Communicasting for Educational Purposes
LOCATION:	Woodland Cooperative Center
OTHER PARTICIPANTS:	Bertha-Hewitt, Clarissa, Eagle Bend, Parkers Prairie
TOTAL 1984-85 FUNDING:	$132,719
FUNDING SOURCES:	TDS Grant, local funds
DESCRIPTION:	The communicasting project is a four-district consortium which is demonstrating the uses of two-way interactive television for instructional purposes. The system has been in operation since 1980. During the current year, three classes on the system serve 39 students.
STRENGTHS:	This was the first interactive television network in the state and the participating schools deserve credit for their participation in the system. Participants believe it is an educationally and cost-effective mechanism for the delivery of instruction. Student achievement is about the same as in a traditional classroom, and discipline problems are non-existent.
WEAKNESSES:	The project has had limited success in achieving the objectives proposed for this grant. Interest in the system appears to be waning; fewer students are being served and fewer courses are offered than in 1981-82. System expansion has also not occurred.
LESSONS:	This project has historically had both communication and cooperation problems. Teachers are, as a result, somewhat hesitant to become involved. Teachers need to be provided training and to be involved in planning for such far-reaching systems.

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TECHNOLOGY DEMONSTRATION SITES

CASE STUDIES

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TECHNOLOGY DEMONSTRATION SITES

CASE STUDIES

January, 1985

Evaluation Section
Minnesota Department of Education

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INTRODUCTION

This is the second in a series of evaluation reports on the Technology Demonstration Program. Enacted by the Minnesota Legislature in 1983, and amended in 1984, the program provides funding to fifteen Technology Demonstration Sites. Some of the sites are just now beginning to emphasize technology; others are comparatively quite sophisticated and are concentrating on demonstration to other Minnesota school districts. All are intended to serve as models of the uses of technology in instruction and management.

There are fifteen Demonstration Sites; ten selected by the State Board of Education in January, 1984, and five separately authorized by the Legislature in May, 1984. The projects involve directly 77 school districts, and represent a direct expenditure of $1.9 million in state funds. Participating local districts have made substantial financial commitments to the projects, as have a number of corporations and private businesses.

An evaluation of the program was called for in the enabling legislation. Responsibility for the evaluation was awarded to the Evaluation Section of the Minnesota Department of Education, under contract to the Technology and Curriculum Integration Section. The entire process is supervised and directed by the Governor's Advisory Committee on Technology in Education. Given expressed concerns about potential objectivity problems, the Evaluation Section retained an internationally known evaluation specialist to assist in the overall design and to serve as an independent monitor of the entire evaluation process. As the design evolved, it was also determined that other independent persons would be retained to provide a major part of the overall evaluation, detailed case studies of each of the fifteen projects.

The case study is a detailed analysis of a program, intended to provide a comprehensive description as well as a variety of impressions and judgments. Case studies are increasingly being used in evaluations, particularly for projects in their early stages.

During the summer of 1984, five persons were hired to conduct these fifteen case studies. They were provided with a detailed manual, prepared by the Principal Investigator, and two days of training with the Principal Investigator and the consultant, Dr. Daniel L. Stufflebeam.

Each was assigned three projects and was required to spend five days on site at each. They reviewed documents, observed inservice sessions and demonstrations, attended project-sponsored events as appropriate, and

conducted extensive interviews with staff and other participants. Staff were closely supervised by the Principal Investigator throughout the process.

The fifteen case studies which resulted from this quite extensive data-gathering are presented here. Also provided is an abbreviated summary and analysis done by the Principal Investigator.

Some immediate constraints are apparent. **First**, the budget for the process was quite limited and therefore limited the amount of time which could be spent at each site. It was clearly impossible to meet with all people involved in the programs, observe all activities, review all documents and gather all possible opinions. We tried to remedy this somewhat by asking TDS staff to review the reports for accuracy and completeness. **Second**, between the time of the last observations and interviews, many new activities have been initiated in the sites. These reports represent a "snapshot" of project activities taken during a quite limited period of time. **Third**, the writing style and overall quality of the reports varies, depending generally on the experience of the staff. **Fourth** and importantly, virtually all of the Demonstration Sites are in the early stages of implementation; most have been operating for less than a year and some for less than six months. So few documentable "outcomes" have been highlighted, for few "outcomes" can be measured at this point.

These studies do provide excellent descriptions of the sites and the reality of the situations in which they are being implemented. We have tried to highlight major potential successes and some of the operating problems encountered by projects.

We are indebted to TDS project staff for the excellent cooperation which they gave to the field personnel. We are also indebted to the following persons who so conscientiously and with such enthusiasm committed themselves to a very difficult task. The case studies were conducted by:

Clark N. Evans
Mary L. Hoaglund
Stephanie J. Mitchell
Russell H. Schmidt
Stacy Hueftle-Stockdill

PRINCIPAL INVESTIGATOR'S ANALYSIS

A reading of the case studies should be preceded with a basic understanding of the Technology Demonstration program. It is a large and complex undertaking, involving a large number of school districts in newly established consortia and in new and potentially significant change and educational reform. Given the substantial investments of state, local and private financial support, it is tempting to expect immediate, measurable results. However, change in any complex institution is slow and often painful, and many problems are encountered in the process. The case studies accurately document many of the problems being experienced in the Demonstration Sites. Some are related specifically to technology: backlogs in equipment orders due to large national demand, substantial costs, security and inventory problems, construction and broadcast licensing delays, and shortage of quality software. Others are human and organizational problems: the difficulties in recruiting and attracting visitors, the need for student and staff inservice, the problems associated with newly developed cooperative arrangements between school districts and between consortia and participating industry, and occasional resistance from already overburdened educators, some of whom see technology as "something else to add." In most cases, TDS project staff are working conscientiously to resolve these problems. However, it seems apparent that to resolve issues, meet goals and objectives and successfully demonstrate model uses of technology will require more than one year and certainly more than six months of operating time.

These implementation difficulties, which are not suprising, also complicate the evaluation task. An evaluation cannot document outcomes of projects when they are not yet fully implemented. It is nearly impossible at this point to measure student achievement, cost-benefits, organizational changes, or the actual transfer of practices from Demonstration Sites to other school districts. We have tried to gather data on these points, but they are most certainly not conclusive nor complete. Where the TDS projects are more fully implemented, the case studies provide more objective data; where they are not the data are largely perceptual. Those charged with making decisions about this program should recognize that additional study is needed, both to continue the attempt to measure outcomes, and also to provide badly needed assistance to the projects in local evaluation which can help them make necessary adjustments.

Despite these caveats, the case studies do provide some clear indications of positive changes. Perhaps most significant is the fact that this project has, for a variety of reasons, literally forced school districts to cooperate with one another - not just for extracurricular events, but for instructional improvement. This cooperation has taken many forms; some of it is financial, in some cases we see school districts actually doing cooperative curriculum

planning and development, and changing and adjusting school schedules and calendars. There have been conscientious efforts to assess the needs of small districts and companion efforts by larger districts to attempt to meet them. These cooperative efforts cannot help but prove beneficial in the long term.

There are also some very clear indications that technology is now being considered as an instructional and managment tool; as a means not as an end. The increased availability of microcomputers, for example, means that they are now being used for courses other than science and mathematics and used for more than teaching programming to advanced students. Teachers who are becoming more familiar with technology are beginning to perceive it as a helpful and ultimately as a labor-saving tool; they can, for example, spend more time working with students and less time recording grades.

It is also clear that this program has helped to spark interest in technology as evidenced by the numbers of visitors to sites and the number of requests for assistance. The TDS projects are developing some quite specific manuals and informational materials which other districts can use to implement changes. The types of requests seem to indicate that the general level of knowledge about technology has been enhanced; there are few requests for "what is this" and many requests for "how can I adapt this for my own use."

The case studies often reveal major problems, as well. For example, it is very difficult for classroom professionals to visit demonstration sites for inservice activities without resources for substitutes. The timing of inservice programs has often been a problem. TDS project staff are beginning to realize they must accomodate their plans to the real needs of classroom teachers. The pressure to emphasize demonstration has often meant that TDS project staff have been unable to devote sufficient energy to the continuing development of their projects. Costs have been enormous and, in some cases prohibitive, especially for the smaller school districts. This has been particularly evident in the interactive television projects. The quality of programming and software continues to be an issue in some projects as they find, for example, that much commercially available software does not deal with higher level thinking skills.

These and other issues have been dealt with to varying degrees in the fifteen case studies. The final report on this project which will be complete on February 1, 1985 will attempt to more concretely address the positive and negative outcomes of the Technology Demonstration Program. The case studies which follow are informative, and will represent a major data source for the final project report.

SUMMARY OF CASE STUDY FINDINGS

The reader will note some differences in both format and style in the case studies, given the preferences of the individual authors. To some extent we have tried to control for this in editing. The reader will also note some differences in the extent to which the authors were willing to offer explicit judgements about projects. The brief summary of each case study/project which follows provides, where possible, a slightly more definitive analysis. These are based on the Principal Investigator's review of field workers' data, continuing conversations with them, and on the other data sources which are part of this evaluation.

BLOOMINGTON INFORMATION TECHNOLOGY SYSTEM (BITS)

This Demonstration Site can show a wide variety of discrete uses of technology for instruction and for the management of instruction. The site has prepared quite a lot of material to help make site visits productive, and the staff are extremely willing to assist visitors. BITS is a large and complex program, with a number of technology-related components, many of which were in place before the TDS grant. It is fair to say that the grant has accelerated processes which were already in motion; many of which would have gone forward but more slowly without it. It is clear that the external demonstration would have been substantially curtailed had the grant not been awarded.

In addition to this major commitment to dissemination/demonstration outside the district, the major emphasis of the BITS program is on the internal transfer of innovative practices using technology. Some of these are proven practices which have been adopted from other locations, others have been and are being developed by Bloomington teachers. They are strategies for managing instruction, like the CAM Instructional Management System; strategies for supporting instruction such as LOGO and Computer Assisted Drafting; and such locally developed efforts as learner profiles for special education and an interactive television class in latin for students in Kennedy and Jefferson High Schools. In all, the project hopes to develop and/or demonstrate 24 specific practices, all of which are described in the case study. Informative materials have been produced on all these practices, however, the strategies and techniques used to promote change have not been made explicit.

This project also proposed to initiate research practices which could account for student impact and cost-effectiveness of these technology-related practices; thus far, however, the research has not been initiated. These data could prove quite useful to other educators if they can be reliably obtained. BITS is an attractive project with many features which could be easily transported to other locations.

BLUE EARTH - PROJECT BEACON

Project BEACON is a fascinating endeavor, one which has enormous potential for documenting the learning effects of computer aided instruction. Although the project has several components, most of the attention is devoted to a fourth grade classroom in which each of the 26 children (13 boys and 13 girls) has his/her own computer. Students have been randomly assigned to the classroom, making experimental comparisons among instructional strategies very possible. The students in the computer classroom began school two weeks early so they could learn essential keyboarding skills. Their instruction is basically individualized, and they spend approximately half their time using the computer with software that supports the established curriculum in reading, language arts, math and spelling. The other project components include extensive use of the computer and word processing software to teach writing skills in the 8th grade; extensive use of computers for instruction and management in special education; and the creation of a comprehensive data base of human and media resources available in the elementary and secondary school. Plans call for the database to be expanded to include the public library.

Advocates of school-business partnerships can look to this project for a model. Local businesses have raised enough money to support a full-time computer coordinator in the district; she, in turn, provides training to the business community. There can be little question that this is an extremely progressive small school district, one which is willing to take risks and support innovation.

With just a few months of implementation, this project is about 80 percent implemented and has much that can be of benefit to other educators. It is also a project which can allow necessary long-term study of the effects of computer use on student attitude and achievement. At the urging of the Principal Investigator, Technology funds will be used to support further study and evaluation of this project.

ST. LOUIS PARK/TOWER-SOUDAN DEMONSTRATION, DEVELOPMENT, DISSEMINATION THREE DIMENSIONS OF TECHNOLOGY TRANSFER

The St. Louis Park/Tower-Soudan project was designed to demonstrate a variety of existing uses of technology in two distinctly different educational settings - a large urban district and a small outstate district. Both districts have leaders committed to and interested in technology and both, commensurate with their size, have a history of technology use. This project was to meet three basic goals: dissemination to other districts, development/revision of curricula in science, social studies and reading to incorporate technology, and training staff to use a variety of technologies.

The project has not, to date, been particularly aggressive in its

demonstration efforts. It was assumed that the designation of the district as a TDS would simply bring visitors to the site; this has not occurred. Staff are now beginning efforts and preparing materials which they hope will encourage visitors. The curriculum development is largely part of ongoing processes in St. Louis Park. The project staff and others hope to meet with curriculum committees to encourage the inclusion of technology into new or revised curricula; however, those activities have not yet occurred. The St. Louis Park district is making efforts in the area of inservice education; six major inservice activities have or will occur yet this year.

Cooperation between the two districts has been quite slow in coming, although the staffs have met, and Tower-Soudan teachers are now being involved in a number of activities. Staff are now beginning to more realistically consider the advantages that real cooperation might bring.

BRAHAM EAST CENTRAL MINNESOTA EDUCATIONAL CABLE COOPERATIVE (ECMECC)

This is a consortium of seven school districts working in cooperation with a private cable television company to provide interactive television instruction. The project can also demonstrate other examples of technology usage including microcomputers and satellite receivers. The program has been extremely well-planned and carefully implemented, and has thereby avoided many of the pitfalls experienced by other consortia implementing instructional television. It should be emphasized that while the interactive system has only become operational this year, the planning process has been underway for several years. This project is an excellent of example of interdistrict cooperation and of partnerships between schools and private business.

The interactive part of ECMECC, while not the project's only component, is clearly where the major emphasis has been placed. The system, which uses cable, began operating in the fall of 1984. So far, six new classes are available to students via the two-way system, and over 100 students are involved. The system is also used for community education and can be used for both formal and informal communication between districts.

The TDS grant represents a rather minor part of the required installation and operating costs of the ECMECC system. The participating school districts have expended a significant amount of money to plan and install the system, which they believe has enormous potential for curriculum improvement. The project has been nearly overwhelmed by visitors and by requests for information, clearly indicative of the amount of interest which exists in this model program.

AUSTIN/ROCHESTER HIGH TECHNOLOGY COOPERATIVE MODEL FOR SOUTHERN MINNESOTA

This project was designed to connect the computer and cable technology of the Rochester Public Schools with the telecommunications and computer resources of the Austin schools. The project was also designed to provide inservice and other assistance to surrounding districts. The Rochester district has been deeply involved with instructional uses of computers for some time; KSMQ TV in Austin has been actively providing instructional television services to schools within its broadcast range. The idea was to link the two districts by microwave to share information and inservice programming, as well as to serve the inservice and other needs of area districts.

The project has had some difficulty getting started. The microwave link between the two districts is not complete due to delays in receipt of equipment and construction of a new tower in Rochester. Staff have been frustrated that the surrounding districts have not taken advantage of inservice availability. Staff are now changing the inservice delivery plan and hope that this will encourage participation.

The districts have used grant funds to remodel and update existing computer labs. Rochester has installed a Corvus Local Area Network and purchased software for the network. Both districts have allocated state and local funds to establish software banks which can be visited by other educators. The Rochester bank is complete; the Austin bank is awaiting the state's most recent High Quality Software list.

The project also hopes to plan for the future needs of the region and the ways in which technology might be used to meet them. These activities will be largely completed in a second year of the project, although some activities are underway, such as a microwave link between Austin and the Southland district allowing an interactive Spanish class.

There are some indications that better dissemination and changes in the delivery system for inservice will encourage other districts to involve themselves in this effort. It is clear that while it was slow in coming, the communication between these two districts has been improved by the project.

HOPKINS TECHNOLOGY EDUCATION CENTER (TECH)

Hopkins has been recognized for its efforts in technology by the award of two dissemination and technology training grants from the National Diffusion Network (NDN). The Hopkins TDS is an outgrowth of a number of these technology-related activities which have been underway in this innovative school district. The project has several objectives, one of which was completed prior to the award of the TDS grant in the second

round of funding. That objective was to further adapt and demonstrate the district's locally developed instructional Mastery Management System. The system has been adapted for the district's reading program and available evidence suggests that its adaptation and implementation has been good.

The TECH Project is also addressing the need for higher level thinking skills. A committee has been formed and the group is now involved in reviewing the literature on higher level skills, developing a workable definition and a model for teaching them. Staff inservice and the review and assesment of available software will result.

The project is also making major efforts in inservice. TECH staff are assisting teachers in identifying their technology-related needs and providing resources in the form of release time, substitute teachers and/or materials. In addition, formal inservice courses have been offered and funds have been provided to distribute new software to all schools in the district.

The project is also working on a new objective, one that was not included in the original grant application. TDS funds are being used to develop videos on a variety of natural events which can be filmed at the Carver Park Nature Center. These can then be shown to a much larger audience than can be accomodated in person at the park.

This project has much that can be of assistance, both locally and to other districts. It is clear that many of these activities were well underway and/or would have been launched even without the grant. However, the grant has provided new resources for such things as release time for teachers, and has provided the district additional resources for dissemination. The level of interest in the TECH components is evidenced by the almost 400 persons who have visited the site.

ANOKA-HENNEPIN INNOVATIVE INSERVICE FOR INTEGRATING TECHNOLOGY IN CLASSROOMS

The INTECH project involves a consortium of eight school districts in the northern Minneapolis suburbs and Anoka-Ramsey Community College and the Anoka AVTI. It is primarily an inservice program, designed to assist with the widespread adoption of technology in the cooperating districts. It builds on the expertise of staff in the consortium who have experience in technology and who are willing and able to assist their colleagues. The project is also attempting to build relationships with area industries, and to provide demonstration to school districts throughout the state.

The project has received a good deal of attention as the result of what has come to be known as the INTECH bus. This is a mobile demonstration laboratory which has traveled around the state and to the consortium schools in support of inservice activities. Included in the mobile lab

are a number of microcomputers, software collections, an interactive computer-laser video disk demonstration unit, a high quality color video tape recorder player and a library of demonstration tapes. The bus is an excellent demonstration tool.

After conducting a consortium-wide needs assesment, the project has developed a priority list of inservice needs. Twenty-two subject areas and/or grade levels are included and staff have been identified who possess expertise both in those subject areas and in technology. These Developer/Demonstrators have received training and are involved in producing training and demonstration tapes. The Developer/Demonstrators also provide training to key contact persons in each school, who can subsequently provide turnkey training to their Departments. The ongoing local training can utilize the bus, local building resources, or either of the two computer labs which are a part of the project.

One computer lab has been established at Blaine Senior High. That lab has been furnished with an extensive grant to the Anoka-Hennepin district from the IBM corporation; a grant which is a direct outgrowth of the designation of this consortium as a Demonstration Site. A second computer lab is operating in Fridley Middle School.

The INTECH staff have been extensively involved in demonstration activities around the state. They are also well along in their inservice efforts. This project is an excellent example of the use of existing staff resources, and of inservice activities which are designed to promote the integration of technology into ongoing instruction.

KNOWLEDGE INTERACTIVE DISTRIBUTION SYSTEM (KIDS)

The KIDS project has been entirely a planning effort to date. It was originally designed as a consortium of 15 school districts in the southern part of the state, two state universities, the Mankato Area AVTI, the South Central ECSU, the ESV Computer Unit and the regional inter-library exchange system. The project was to plan for, construct and operate an interactive television network which would allow shared instruction among the consortium members.

The consortium has been involved in extensive cooperative planning. Engineering consultants were retained, specifications developed and bids let. The single acceptable bid for the system was $1,726,000 or $109,169 per district; just one of the participating districts felt it had sufficient resources, all others rejected the bid.

Given the enormous cost for an interactive system of this size, the project's governing board voted to ask the permission of the State Board of Education to reduce the size of the consortium to four school districts, representing the project's northern cluster. The State

Board unanimously approved the redesigned KIDS project, although they attached several stipulations. Briefly summarized, the Board restricted the use of the grant funds to construction of a link from St. Peter to Mankato State University and/or the AVTI. The districts would be required to finance their own individual systems and, importantly, state funds were not to be released until binding contracts were executed.

The four districts in the northern cluster - Cleveland, Le Center, Nicollet and St. Peter have received revised construction bids. They are, at the moment, unable to agree on a mechanism for sharing costs, and the fate of the KIDS effort is not at all certain.

MINNEAPOLIS TECHNOLOGY DEMONSTRATION SITE

The Minneapolis TDS is a large and complex project. It is designed to demonstrate the extensive uses of technology in which the district has been engaged, as well as to provide for overall improvement in five of the district's magnet programs, all of which extensively use technology.

The project has been somewhat delayed in its start-up but is now well underway. It has been involved in a variety of demonstration efforts and is pursuing a variety of ways to both attract visitors and to help them understand and be able to use some of the many and very sophisticated uses of technology in the magnet programs. The project has also provided support to a curriculum and staff development effort for the magnet programs. A substantial number of new courses have been developed, and there are indications that the planning and development process has encouraged cooperation and the sharing of information and resources between the magnet programs.

The Minneapolis TDS has both a highly visible and very sophisticated side, and one that is much less visible and/or glamorous. Visitors to the site can observe two very sophisticated TV Production studios, an FM radio station described as the most advanced of any school-based operation in the nation, widespread use of micro and mainframe computers and a large number of instructional activities which rely heavily on technology. It is more difficult to observe the process of curriculum development and program integration which is also a major part of the project. Data to date suggest these efforts have been quite successful. Staff are preparing a large number of informational materials on these efforts which can ultimately be useful to other educators.

MONTEVIDEO MINNESOTA VALLEY TELE-NETWORK

The Tele-Network project is an outgrowth of a major planning effort of the SW-WC ECSU and Southwest State University which proposed to address the problems of isolation and restricted curriculum offerings in schools in the southwest corner of the state by design and construction of an area-wide interactive telecommunications network. When completed, the Tele-Network will be the first link in a system eventually proposed to serve 18 counties in the area. It involves nine school districts in a partnership with Pioneer Public Television.

The project has been extremely well planned and cooperation among consortium members is described as excellent. The system has, however, not yet been completed and while operating plans have been made, will not begin to offer classroom instruction, community education or inservice education until January of 1985 or later.

When completed the system will employ Instructional Television Fixed Service (ITFS) and a variety of additional microwave equipment. The system has been hampered by such factors as delay in the granting of necessary FCC licenses, weather-induced delays in constructing the Pioneer tower, a British dock strike and the complexity of the custom construction. Costs have been high; system construction costs will be nearly $700,000.

This project is an excellent example of cooperative planning; it is also a unique example of a partnership between a public broadcast station and a number of school districts. This increases the potential usefulness of the project to its own members and to other districts in areas served by public or private broadcast services.

DULUTH NORTHEAST EDUCATIONAL TECHNOLOGY CONSORTIUM (NEETC)

NEETC consists of eight school districts in Carlton and St. Louis Counties, in partnership with the Control Data Corporation (CDC). The project is designed to provide schools with hardware and necessary inservice instruction which can ultimately assist in the management and the improvement of instruction.

Nearly $800,000 (including contributions from CDC and member schools) has been expended on the project. A wide variety of equipment has been purchased including microcomputers, PLATO courseware, other software, and quite sophisticated equipment for science instruction. Computer labs are operating in all secondary and many elementary schools, and all secondary students will receive some training on the computer.

The project has also been actively involved in providing staff inservice in NEETC schools and in dissemination activities to other educators. The bulk of activity clearly has been on the distribution

of equipment, development and dissemination of new programs within the consortium. Data suggest that cooperation among consortium members has been excellent.

SHAKOPEE TECHNOLOGY DEMONSTRATION PROJECT

The Shakopee project is an extension of a microcomputer program which was first developed in the district in 1982. The program is a combination of Local Area Networking, a system of interconnecting microcomputers to allow shared access to programs, and a mathematics curriculum. The grant has allowed expansion of the networking system to three elementary schools, the Cooperative Area Learning Center and the Womens' Correctional Institution.

The LAN allows the district to offer otherwise unavailable classes to students, and provides for more efficient and less burdensome record keeping and management for teachers. Program staff also believe that the LAN solves many of the expense and management problems which are common to the use of stand alone micros.

Each of the three elementary schools has been provided with a Corvus hard disk networking system and 14 Apple IIe stations linked to the network. Teachers have received inservice in a variety of software. Approximately 142 sixth graders are using the math courseware developed for the LAN. Students at the junior and senior high are also involved in the computerized mathematics curriculum. Both the Carver-Scott Learning Center and the Women's Correctional Institution have been provided with computer networks and microcomputers for instructional purposes.

The Shakopee project has also been actively involved in demonstration of the system. Nearly 200 persons have visited the project in the past ten months. The project has experienced some major successes, although there are also some clear indications of problems, particularly in the quality of software. This project does have much to offer to other districts who might be able to adapt the networking concept to allow them to add courses without having to add staff.

NORTHWEST ECSU SUBJECT MATTER AWARENESS - IMPLEMENTATION OF RESOURCES IN TECHNOLOGY (PROJECT SMART)

The SMART project is a cooperative effort of the NW Educational Cooperative Service Unit and 16 area school districts. It is a developmental effort, focusing on the technology inservice needs of these small school districts. The project hopes to demonstrate that small rural districts can optimize the use of existing equipment and expertise, and expand the use of technology resources through cooperation.

Project staff inititally expressed concern that efforts to incorporate

high technology would result in expenditures for equipment that, like the previous "low technology", would not be fully nor effectively utilized. The project's first task then was to inventory equipment and software already available. The second major task was to develop a cooperative inservice program which would promote the full use of existing equipment. The mechanism for inservice is a cadre of 18 Subject Matter Specialists recruited from among the participating schools. The Specialists participated in a week-long training/planning workshop. They were then to provide inservice and individualized assistance to their colleagues in such areas as word processing, computer literacy, teacher utilities and grade management, video taping/using and low technology utilization.

The process of local inservice has been a problem for Project SMART. It has been hampered by the resistance to change being expressed by staff members when asked to consider technology in their program. In several districts it was reported that inservice was hampered by a lack of equipment; in others the problem has been the lack of resources for substitute teachers. Several strategies are now being employed to attempt to deal with these issues.

Given the developmental nature of this project and some of the problems in the inservice delivery, the project is not now ready for demonstration.

ROBBINSDALE TECHNOLOGY LEARNING CAMPUS (TLC)

The Robbinsdale Technology Learning Campus is basically a brand new school in the Robbinsdale district. It was initiated as one way to provide what is considered to be a needed alternative program, as well as to demonstrate ways by which technology can be implemented into curriculum. As a new school, TLC has experienced some success; it has also encountered some very typical problems. Given the very ambitious nature of this effort, additional time will be required for TLC to demonstrate its outcomes - both positive and negative.

292 6th, 7th and 8th grade students are enrolled in TLC. Staff have made a concerted attempt to balance enrollment between males and females. The student population represents a mix of background and achievement levels. All students take a number of required courses, including a course in telecommunications. Students can choose to take art, music, and/or foreign language classes, in addition to which they are enrolled in two elective courses each semester. The school is housed in the Robbinsdale Community Education Center, allowing students interaction with senior citizens. The program also encourages students to participate in a variety of volunteer activities in the community.

Implementation has been hampered by very typical delays in preparing the physical facility, by a shortage of equipment, and by inservice and curriculum development needs. Certain problems are also being

experienced by the fact that the staff are unused to dealing with what is essentially a middle school population.

The project has experienced considerable success in meeting its objectives to plan, staff, equip and open a new school and to enroll students. Response from parents has been favorable, and the administration of the district, very committed to the program, has been helpful in revising program schedules and in adding staff to lower the student-teacher ratio.

The project needs to continue work on staff and curriculum development. Additional equipment is also needed. This is a very complex and ambitious program, and it is conceivable that the pressures imposed by the TDS designation have caused the staff to implement the program too quickly. At least two more years will be necessary for the continuing development of this unique effort.

WOODLAND COOPERATIVE CENTER COMMUNICASTING FOR EDUCATIONAL PURPOSES

The Communicasting project is a four school district consortium which is attempting to demonstrate the efficacy of two-way interactive television for instructional purposes. The project has been in operation since 1980, and was the first project in the state to experiment with interactive television. The participating school districts are Bertha-Hewitt, Clarissa, Eagle Bend and Parkers Prarie.

Virtually all who are actively involved in this project believe that it has been successful, that interactive teaching is both cost and instructionally effective, and that the program has enabled significant improvements in curriculum in the four districts. They believe, moreover, that the project has much that can be demonstrated to other educators. Data substantiate that a number of positive outcomes have been achieved.

The Communicasting project has, however, had limited success in achieving the objectives it proposed to accomplish with the TDS grant. It has been unable to expand the courses offered to students, fewer students are being served and fewer courses being offered than in 1982-83. Inservice activities have occurred, but largely through the impetus of a Bush Foundation grant to ECSUs 5 and 7. The project has, for a variety of reasons, been unable to provide comparative analyses of the benefits of this telecommunications alternative to other modes of instruction; and, limited planning for system expansion has been done.

C A S E S T U D I E S

BLOOMINGTON INFORMATION TECHNOLOGY SYSTEM (BITS) CASE STUDY

I. INTRODUCTION

The emphasis in this program is on transfer and demonstration of both strategies and instructional systems. The components are designed to integrate technology into the learning process either as an instructional tool, a means of acquiring information, or as a management system. The BITS program demonstrates 24 different uses of high technology using TV and computers. Most of these were in place prior to project funding.

A major project goal is to articulate the kinds of management climate and strategies that foster the development and use of high technology in the instructional process. Shared curriculum decision making, administrative support for creative staff projects, systematic review of curriculum areas are a few of such strategies. At issue here is whether these kinds of things can be demonstrated concretely and transferred to other school systems.

A second goal is to demonstrate 24 specific methods by which technology is integrated into the educational process. Here the issue is whether other districts with fewer resources will feel they can do what Bloomington has done. Will they gain enough information to make that decision?

The theme of the BITS program might be said to be using high technology to learn, as well as learning about high technology.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT

Bloomington is a large (83,000 population, 39 square miles) middle and upper middle class suburban community in which are located the headquarters for a number of corporations related to high technology. The school district comprises 12 elementary, 2 junior high and 2 senior high schools with a total student body of 12,450. Currently, 70 percent of graduates go on to two or four year colleges and others go on to area vocational and other post-secondary education. Many students have access to microcomputers in their homes. Many parents are involved as school volunteers or on committees.

The Bloomington public schools involve teachers in curriculum development on a districtwide, systematic basis. Teachers are encouraged to experiment, to develop instructional materials and even to market such materials if the demand exists. Most of the buildings are relatively new and they have been built with some technology (e.g. TV) in mind. About 500 visitors per year come to these schools from Minnesota, other states and even from abroad. The district encourages sharing ideas and materials within and outside the district.

B. NEEDS-IDENTIFICATION PROCESS

A 1980 position paper called for careful planning to ensure that Bloomington students and teachers have access to microcomputers and that their use be integrated into the school curriculum. An Instructional Technology purchase plan followed and computer literacy was integrated into the curriculum scope and sequence. Computer programming courses were added. Two computer management systems were in use, the CAM and ANNEHURST systems. The Technology Utilization Plan identified the following needs:

1. To integrate technology into the regular instructional process.

2. To strengthen staff knowledge and utilization in the use of new technology.

3. To incorporate technology into administrative management practices.

4. To strengthen community-wide involvement into the planning and development of the district's technology program.

5. To promote affirmative action opportunities in the area of technology throughout the district.

The primary perceived need was to integrate technology into curriculum and instruction so that it facilitates learning. To do this required a large investment in equipment, software and professional time both in in-service and in curriculum development.

The immediate need for the district was to disseminate within and among its schools the uses of high technology already in place. Four stated needs for the project are:

1. Train teachers to be users as well as instructors of microcomputers to assure district-wide consistency in use of information technology.

2. Try out a range of pilot programs in all areas of learning to find the many applications of technology for improving education.

3. Vitalize the school and community commitment to time, dollars and human energy as equally important integers for shaping an information technology program that catches up and keeps pace with technological design and development.

4. Extend the reach of the schools to all segments of the population with awareness that education is increasingly a lifelong necessity.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

Bloomington was moving ahead in its use of high technology, with multiple computers in all elementary and secondary schools, TV monitors, videotape equipment and cable TV in each building.

At the time of BITS project funding, the following technology for instructional purposes was in place:

Elementary Schools.

-- At least ten computer stations per school for instructional computing.
-- At least one printer per school for instructional computing.
-- One staff person on extended assignment for computer leadership.
-- At least one videotape machine per building.
-- Cable TV in each building.
-- Various pilot computer programs in different schools.

Junior High Schools

-- At least 26 computer stations per school for instructional computing.
-- Two additional stations for special educators.
-- On-site leadership in computer instruction.
-- Videotape equipment in each school.
-- Cable TV in each building

Senior High Schools

-- At least 48 computer stations per school for instructional computing.
-- Twenty-five course guides for business, office and marketing classes rewritten.
-- Courseware and computer labs in math and science.
-- Computers in resource centers.
-- At least two microcomputer stations in special education.
-- At least ten videotape machines per school.
-- Cable TV access.
-- Facilities for originating cable TV programs.
-- District resource lab has 12 computer stations.
-- Community education has six computer stations.
-- IMC film and videotape library of over 2,000 titles, 500 diskettes and associated manuals for TIES and MECCC and over 100 commercial programs. IMC houses TV studio, production studio, darkrooms and post-production lab for cable TV.
-- Two TV origination stations in IMC.
-- One community broadcasting Monday-Friday and one closed-circuit.
-- Repair facilities for microcomputers and other AV material-- authorized dealer.

D. GOALS

The broad goal for the project is to continue the work of integrating the use of multiple technologies into the school setting for greater efficiency and cost-effective delivery of instruction. To this end the project will provide methods to help teachers involve technology in the instructional process.

Specific project goals are:

1. Activate a quality consistent staff development and instructional delivery system through the existing network of computer instruction leaders and resource center specialists in all buildings and educational centers with the assistance of two-way cable TV.

2. Disseminate building piloted exemplary programs to other sites and install procedures that encourage trying out microcomputers and video technology in all areas of learning.

3. Install appropriate research design practices that will attest and account for student impact, cost-effectiveness and transferability of instructional strategies and resource materials.

4. Activate installed but infrequently used interactive cable video as a school/community network for staff development, shared instruction, eventful information, and citizen awareness about information technology.

III. PROGRAM INPUT

A. STAFFING/RESOURCES

Project staff consist of the project administrator, an instructional technology specialist and a secretary. The administrator reports to the Director of Instructional Materials Center who has spent many hours in the planning of this project. Also involved in planning were the district Curriculum and Instruction Council (36 members), the Computer Instruction Advisory Committee (two teachers, two principals, six central office administrators), and the Citizens Advisory Committee on Computer Instruction (21 community members), 22 district media resource people, and the Hardware Committee for Technology (13 members).

B. FINANCIAL SUPPORT (MARCH, 1984-JUNE, 1985)

State of Minnesota

Technology Demonstration Grant Funds	$125,120

Bloomington District Funds

SPPICE (Block Grant funds)	$ 14,338
SD (1983-84)	5,000
Computer Leadership Funds	19,756
Elementary Project	16,000
Technology Utilization Plan Funds	46,000
SD (1984-85)	20,078
Block Grant (1983-84)	2,390
Block Grant (1984-85)	8,000
Instructional Technology Purchase Plan	20,000
New Capital Outlay	56,970
TOTAL	$333,652

This does not include the value of time spent by administrators or teachers in responding to visitors' questions, nor the time of the three district administrators most closely involved with the project.

C. PROGRAM PLAN

This project dovetailed with planning for use of high technology that had been going on in Bloomington for several years. As a demonstration site, this project selected some examples of use of technology already in place for dissemination to other sites in Bloomington; some examples purchased from the marketplace were installed for project refinement; and a few new examples created by Bloomington teachers were further developed.

There were a total of 42 activities listed under these objectives. Because the BITS project is so thoroughly integrated into the district procedures and goals, separation of project activities from other ongoing activities is difficult. For example, some staff development was done by project personnel and other staff development was done by the director of staff development for the district; both sets of activities served the end purpose of the BITS program.

A brief description of the 24 examples of integration of high technology into the school setting are individually addressed in Section V - Outcomes below.

A variety of activities undertaken by project staff include:

Staff Development: Needs assessment; awareness conferences; workshops for districts clerical and aide staff, administrators, sixth grade teachers, and business teachers; courseware fairs; subject specific training sessions; in-service courses on computer/technology.

Dissemination: Awareness conferences, developing procedures and guidelines, securing extension of specific programs.

Research: Designing and setting up research on student impact, cost-effectiveness, and transferability of these instructional strategies and resource materials; in cooperation with Normandale Community College faculty and students; preparing dissemination packages about Bloomington exemplary programs.

Increase Use of Interactive Cable TV: Use of cable TV to Normandale Community College, Parent/Child Center and Community Education Center at Bloomington Education Center; cable cast training in computer instruction in cooperation with Normandale Commnity College; use it for circulating educational information; developing citizen and student access resource banks; computerizing data about Bloomington schools for access by phone; extend use of technology lab at the Bloomington Education Center; develop home access computer instruction for parents and preschool children; create VCR on computer-related issues and software for cable task; develop collaboration with five businesses to share co mputer technology information.

D. TARGET POPULATION

While the proposal listed numbers of students affected, the effect is indirect. This project is designed to impact Bloomington teachers and administrators and visitors to the project. These numbers are a great deal smaller. The 1983-84 staffing report indicates the following staff equivalencies:

Elementary Staff	242
Secondary Staff	370
Administrative Staff	41
Special Education Staff	128
Annual Visitors to Bloomington Schools	500 or More

E. POTENTIAL BENEFICIARIES

The ultimate clients of this project are the students of Bloomington and of other districts which may adopt one or more of the demonstration programs. The improvement of instruction is the ultimate goal.

IV. PROGRAM PROCESS

A. IMPLEMENTATION INCLUDING DISCREPANCIES FROM PLAN

All of the selected programs are in operation except the following:

Major Education Networks: The state network does not yet exist.

Interaction Between Schools: Other than the Latin class, no occasion has yet arisen to use interactive cable TV.

Staff Development Workshops on Cable TV: Workshops have been held, some on TV, but the interactive feature has not been used.

Data Management for Music Instruction: Equipment has not been received.

Most of the activities listed for the project staff have taken place. Staff development activities listed have been done or are being continued except for a software fair, deferred because of the Quality Software effort by the State Department of Education, and subject-specific in-service program on computers for instruction. This will occur when the interactive cable TV is brought up to standard in all buildings.

Dissemination activities are continuing. CAM was extended to five elementary schools, rather than six and not to a junior or senior high school. The ANNEHURST program was extended to one, rather than two elementary schools. Two different library management systems were tried for comparison purposes, rather than extending the Winnebago system. Two different computerized telephone attendance systems are being tried for the same purpose. Extension of the Hillcrest Effective Procedure With Technology project to three other schools has not occurred.

Guidelines have been drawn and approved for the use of research to test and account for impact, cost-effectiveness and transferability of these program strategies. The actual research, however, is not taking place at this time. Research activities are planned for later in the project year.

Dissemination packages have been developed. There are brochures about all but two of the 24 exemplary programs. These usually include a program description, visitation information and sometimes other information about the program. An "Evaluation of Visit" form is included in each brochure for feedback on the quality of the demonstration. A form has been developed for visitors to specify what programs they wish to observe and what other areas they seek information about (e.g. curriculum development, instructional resources, research and evaluation, staff development).

Testing of Borg-Warner's ufonic voice system is now occurring. Multi-media simulations related to the SPICE program have been completed for elementary and junior high school level.

Planned activation of the interactive cable TV system has taken place to a limited extent. Origination capability is up to standard at Jefferson High School, but not at the other Bloomington sites as yet. There was no demand for cable cast staff training in computer instruction from Bloomington or Normandale Community College staff.

The cable is not in place for interactive TV between Bloomington schools and Normandale Community College. Citizen access and student access resource banks have been developed for microcomputers, but not for word processors.

Community college students were not commissioned to prepare a data bank to be accessed via phone. Use of the technology lab at the Bloomington Educational Center by community residents and professionals has been expanded, especially in the use of VCRs. No program was developed for parents/children cable cast computer instruction. Still to be developed is the VCR on computer pedogogy ethics and software cable cast to citizens and building staff.

B. INTERDISTRICT COOPERATION

Cooperation with Normandale Community College is unlikely because of problems with cable access. The only other form of interdistrict cooperation occurs with Bloomington's welcome to visits from other districts.

V. PROGRAM OUTCOMES

A. SUCCESS OF IMPLEMENTATION

Electronic Bulletin Board: The messages are easy to read. Teachers appear largely to ignore this. Those asked if they check it daily said no. It is not relied upon to convey essential messages.

Meteorology Data: While students were not observed using these data, the process appeared interesting and enlightening. This is an example of students using the computer as a learning tool. Requiring very little computer time, it illustrates basic principles about weather.

Two-Way Video Instruction: After some early transmission difficulties, this program appears to be working smoothly. The ten minute discrepancy between schedules of Kennedy and Jefferson is used to advantage by the instructor, who handles the medium easily. Occasionally a student at the remote site may have difficulty being heard when asking a question or responding. But generally, the interaction appears quite natural. Since the two groups of students have met, there is a sense both of comradeship and friendly rivalry between them. It seems that the course operates at a fairly rigorous level.

Satellite Disk for Accessing Learning: This was used on November 14 for the first teleconference. Spanish language broadcasts from Los Angeles have been taped for use by two Spanish teachers. These give students practice in listening to the language rapidly spoken with appropriate actions by a variety of speakers. A philosophy series may be taped for a philosophy class.

ANHURST Curriculum Classification System: This system is in active use by teachers and students at Indian Mounds School. It is somewhat primitive and slow and not user friendly. The plan is to tie this system to CAM and to adapt it for use by the students themselves before installing it at Oak Grove Elementary. There are far more learner characteristics than the average teacher would want to identify. The librarian reports that usually teachers identify only a few characteristics.

Library Circulation Management: The Book Trak system is used by even grade 1 students and works very well, although it has required many staff hours to enter data and to "debug" the system (still not complete). It generates lists of overdue books by class or by students. It completes inventory very rapidly and frees library staff from clerical chores to work with students. Library use has increased under the system; children enjoy using it. The Winnebago system is used by staff only. It greatly speeds up checkout, checkin, overdue lists and inventory, cutting staff time almost in half, according to the librarian. The sensing wand in this system appears to be less sensitive and more difficult to use.

Computerized Home Phoning: The TELSOL was observed by the evaluator. Attendance data, by period, and detentions are read and phone numbers entered into the machine manually. Each home is called between 5:00 p.m. and 9:00 p.m. with an appropriate message, recycling through the list three times if phones are not answered, at 55 calls per hour. Other uses are for congratulating parents for community support, announcing career planning tests, registration, etc. Attendance has improved since its use, but other attendance raising programs are also being used. Community response has been good.

Logo Pre-Programming Skills: Teachers using the MECC pre- programming packages seem unanimous in their approval of these materials. Students are learning rapidly and enjoying the work.

Computer-Assisted Drafting: Due to injury, the teacher has been absent several weeks. Students have taught themselves to use and demonstrate the equipment, which greatly enhances drafting instruction.

Computer CAT Library Management System: The librarian using this is delighted with it, although it requires enormous amounts of time to enter data. Every item will be accessed by subject and by author. Students are using four terminals to access the system now and "love it." This is another example of students using the computer as a learning tool.

Health Profile Data Management: This system was awaiting delivery of some equipment when the teacher/user was interviewed. It is an anti-smoking program. Students measure and enter data on themselves, 15 measures over five weekly inputs, and will compare their data with averages of other groups (e.g. football or cross country team, senior class boys or girls). Another example of using computers to learn.

Robotics for Industrial Use: This is a part of the required 7th grade industrial arts course. Students are exposed to computer programming; word processing; a robotic arm; a HERO robot, which they program; armitron, a toy-like robot and several sensing devices. The program is designed to illustrate many of the applications of high technology to industry. Design of the six week sequence makes maximum use of a very few pieces of equipment and would appear to be very interesting to students.

Synthetic Speech: Computer-generated speech on the program observed was more natural sounding than on many such programs. The software programs observed were difficult enough to engage a gifted child; evaluating them will probably teach the students some useful skills. The two programs observed were visually unattractive, but seemed instructionally respectable.

Word Processing: Teachers and students observed are enthusiastic about this. Students jealously guard their time on the computer and learn very quickly how to handle the program. Teachers feel that the ease of word processing, once the techniques are learned, will increase the amount of writing and re-writing done by students. It will especially make a difference to students whose handwriting and spelling hinder their creative efforts. Another example of using computers to learn.

Drills for Language and Speech: Speech clinicians prepared these programs for students whose language is substandard. They drill students in frequently misused irregular verbs. Under the BITS program, they were put on computer, which adds to the immediate feedback and reinforcement of the program. There are still improvements to be made, but the teachers find them helpful. Computers never tire of responding to handicapped children.

Language Arts Grading Management: The teacher/developer of this program is highly enthusiastic. His student aide said she learned to use it in five class hours. Thirty teachers have signed up for his in-service course on the program. Students say they like the program because "they know where they stand where grades are concerned." Features are to be added, but the system now simplifies recordkeeping and grading because the teacher enters a score only once.

Learner Profiles for Special Education: This program, still in its early stages, aids decision making for special education teachers by providing on one page a history of test scores, plus current educational prescriptions. A second program lists students' ability scores and indicates differences in ability as measured by different tests. This may provide clues about possible reasons for poor performance. A third program helps with management of the LD support system by listing students by mainstream teacher for comments, by LD teacher for caseload, etc. Though useful, none of these programs seems yet ready for dissemination.

Simulations Program: The elementary version has been in use since September, 1984. Students work in groups of three, choosing the "right" response to situations dealing with computer ethics. Students observed using the program appeared to be deeply involved and teachers report that they enjoy it. The junior high program was used by the evaluator; it is part of the second semester 8th grade social studies curriculum. Three students form a computer software company and are faced with three very realistic simulated ethical/business problems, deciding together on the best course of action; which might be more or less ethical and more or less profitable. A teacher's manual has been prepared for the program. Although some syntax problems remain, this is an impressive and creative program which fills a tremendous need. It will be a highly transportable method of using a computer to learn complex material.

Skills Practice Lessons: These 29 computer games were created by high school students based on materials in grade four and five reading programs. They had not yet been used by students when evaluated. Those previewed appeared to be of a fairly high interest level with no programming bugs. Some refinements would make them easier to use (e.g. more separation between lines of print). These too, would be highly transportable. It seems cost-effective to use programming instruction at one level to produce drill and practice materials at another.

Other Activities: Staff development activities play a large role in this project. No evaluation data were collected on the quality of this effort. In spite of awareness conferences, teachers were not "sold" on some of the projects slated for dissemination into their schools.

So far, no data are being systematically collected on the dissemination process where it is taking place. No structures exist as yet for comparing word processing systems, home phoning systems or library management systems, and the research component on student impact, cost-effectiveness and transferability has not been set in motion.

It seems fair to say that the technology demonstration site grant accelerated the process that was already in motion and that it caused a greater effort in the area of dissemination. The observer has the feeling that most of what has happened would have happened without the grant, but more slowly. This is not to say the grant money was wasted; this district was poised to make good use of any additional funding.

Very few negative comments surfaced during the evaluation. The most common one was that teachers working with computer programs of any kind found the time commitment required was more than they would have imagined. They all seem to feel that commitment was worthwhile. Some teachers interviewed felt that the district was throwing "too many things too fast" at them. The director of Staff Development said the BITS program created a heavy drain on her funds to the detriment of other aspects of staff development. Two unanticipated outcomes include the increased circulation in the library with the Winnebago system and the "conversion" of the teacher using the electronic grade book from a computer phobe to a computer phile. He has since begun using the computer for test generating and word processing.

One fortunate occurrance during the year was an agreement with Control Data that put a number of computers into Bloomington secondary schools. This freed district capital outlay funds for the elementary and junior high schools and equipped them better to use BITS programs.

B/C. OBJECTIVES ACCOMPLISHED/OUTCOMES

This demonstration site can show a wide variety of uses of technology for management of instruction and for instruction, direct and indirect. It has made provision for visitors to see these programs in action and has prepared procedures and materials to make visits productive. It has not yet made explicit the techniques and strategies used to produce change and the creative use of technology by Bloomington teachers. The project director feels that this is an essential part of what Bloomington has to show, but the visitor must dig hard to tie technology to curriculum cycles, district-wide teacher participation in curriculum writing, procedures to encourage risk taking, etc.

This project does not focus on curriculum writing. The class using robotics, the health profile data management and the skills practice lessons systems are the only curriculum produced. The simulations and drills for language and speech represent pre-existing curriculum adapted for computers.

The project budget shows that State funding was used primarily for salaries of project staff and for teacher release time and contract services ($97,478). This translates into staff development and dissemination activities. Equipment purchased with State funds totals $22,640.

D. PERCEPTION OF PROJECT LONGEVITY

This project accelerated movement in a direction the district was already taking, so it seems safe to say that it will continue. The rate of speed will depend upon the availability of outside funding.

VI. SYNTHESIS/SUMMARY

Unique to this system is the variety of uses of high technology exemplified. Unique also, if it materializes, will be the focus on the school climate that fosters creativity and experimentation and the strategies for change.

This is a good site to explore the issue of what are the most effective and cost-effective uses of high technology. What kinds of curricula and what kinds of students are best served by what kinds of programs? The literature on computers in education suggest that the best uses are in the management of instruction, using computers to learn and in drill and practice for special students, rather than presenting new information to normal students. This is an area that might profitably be studied further. As a demonstration site, BITS has some attractive features.

The individual programs are all within the reach of small district resources. Many of them are easily transported, although others still require considerable work. The project staff and the teachers involved seem genuinely interested in helping others to use their programs.

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BLUE EARTH TECHNOLOGY DEMONSTRATION PROJECT

CASE STUDY

I. INTRODUCTION

The major themes of the Blue Earth Technology Demonstration Project relate to the integration of technology into the curriculum, the expansion of technology utilization, and research on the appropriate uses of high technology in education. The project is an extension of programs and activities which have been underway in the district since 1981.

With the resources provided by Technology Demonstration grant, the objectives are to: 1) implement a fourth grade computer classroom, 2) use technology to address special education needs, 3) teach English composition skills to eighth grade students through the use of word processing, and 4) create a comprehensive community resource file of human and material resources for students, educators, and the public.

Blue Earth is among the demonstration projects categorized as "exemplary." While continued growth and development in technology integration and in-service training are a focus for the 1984-85 school year, the project is approximately eighty percent implemented and is readily demonstrable. Visitors to the site can observe an exciting elementary computer classroom, a variety of special education uses of microcomputer technology, the use of a word processing network for junior high composition courses, and an operational community resource file.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT

The Blue Earth-Frost School District serves a community of nearly 4,000 residents. The communities are located in south central Minnesota, near the Iowa border, approximately 135 miles south of the Twin Cities. The district has a total enrollment of 1,055 students; 541 elementary students in grades kindergarten through six; and, 514 7-12 secondary students. Dr. Kenneth Queensland has been the superintendent for thirty years. The district's administration is committed to the improvement of educational practice and to the testing of new instructional techniques. The teaching staff is stable and mature, most with ten-fifteen years of experience and many in the upper half of the tenure structure. The school board and community residents take pride in their school system and place a high regard on quality education. The district can demonstrate a unique example of school-business community partnership. It was into this environment that Project BEACON was born.

B. NEED

The need for developing a technologically literate population is the primary reason for initiating Project BEACON. As one school board member states, "we live in outstate Minnesota, but our children may be elsewhere in ten years; we need to ready them for the future."

The needs identification process in Blue Earth involved representatives from both the schools and the community. The identified needs included: 1) developing individual education plans (IEP's) to better meet student needs and decrease teacher paperwork, 2) assisting special education teachers with documentation and instruction, 3) providing better access to educational and human resources through a community and school library database system, 4) improving writing skills of high school students. The Computer Committee felt that microcomputers could be effective tools in helping to meet these needs.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

The Blue Earth Schools' Technology Demonstration Project is an outgrowth of the district's established computer program and the long-range planning efforts of the Blue Ribbon Committee on Computer Literacy. High technology advances have been implemented in the district since 1969 with the Southern Minnesota Computer Timesharing Program. Blue Earth utilized MECC's technology information and services during the 1970's. In 1978, through the efforts of elementary principal, Gary Honken, the district purchased two Apple computers and developed a model elementary school office using high technology. The district also developed Project SEARCH (Title IV-C), a computer education program for gifted students.

A Blue Ribbon Committee on Computer Literacy was initiated in 1981 by the Board of Education to plan for technology education in the district. They visited model sites, wrote curriculum, and identified minimum competencies in computer education for staff and students. During 1982, the committee organized in-service training for the staff. Additional microcomputer equipment was purchased; at least one for each grade level, as well as several for administrative and special education uses. Elementary teachers had an Apple in their classroom for a month at a time three times a year on a rotating basis. In February 1983, the Blue Ribbon Committee issued a report on computer literacy, including a K-12 scope and sequence for computer education. A senior high school computer lab was inaugurated with 13 Apples networked to a Corvus 20 megabyte hard disk for courses in mathematics, computer literacy, programming, and word processing.

During this same period, the Search project was ending and the district began to explore other methods to involve more students in learning appropriate technology use. The Committee decided to approach the local business community and seek funding for a school- community computer coordinator. Almost $70,000 was raised as local businesses agreed to donate $1,000 each for three years to support a computer educator to work with students, staff, and the business community. The Blue Ribbon Committee hoped to match this contribution with a Technology Demonstration Site Project. Four educational technology applications were selected to build and expand on the district's existing resources. Project BEACON was named to recognize the Business Education Alliance seeing Computer-technology as an Operational Necessity. The computer coordinator was hired in December, 1983. An elementary computer lab, with 16 Apples and a Corvus 20 megabyte hard disk networking system, was organized in January 1984. Teachers began to view the computer as an "educational tool" instead of "just a computer". Extensive in-service training in computer awareness/terminology, BASIC and LOGO programming, identifying and using appropriate software, and MECC products developed teachers' interest and application of technology aided education. A software evaluation process was instituted. The Blue Earth district was already committed to implementing the technology demonstration site activities over time; the grant award allowed them to accomplish their objectives more quickly.

D. PROGRAM GOALS

Project BEACON presented the following objectives for the technology demonstration activities:

ACTIVITY A. COMPUTER CLASSROOM OBJECTIVES

1. Allow children to use computers as the primary tool for classroom learning.
2. Allow the teacher to implement an individual education plan for each child in the classroom.
3. Allow the classroom teacher to develop and test appropriate software for future use at the 4th, 5th, and 6th grade levels.
4. Allow instructors to test the effectiveness of keyboarding instruction at 4th, 5th, and 6th grade levels. This will enable keyboarding to be taught at the grade level where it is most appropriate.
5. Allow students absent from the class to view important lessons that were missed.

ACTIVITY B. SPECIAL EDUCATION OBJECTIVES

1. Allow handicapped students to learn more effectively by maximizing their strengths.
2. Allow special education staff to more effectively monitor the behavior of special education students.
3. Allow the staff to better manage the due process system and individual educational program plans for special education students.

ACTIVITY C. DATA BASE SYSTEM OBJECTIVES

1. Allow all residents of Blue Earth (students, teachers, community education, library patrons, business persons, and others) to have access to human and educational resources of value to them in their community.

ACTIVITY D. WRITING THROUGH WORD PROCESSING OBJECTIVES

1. Allow students to better visualize sentence and paragraph development.
2. Allow students in 8th grade composition to increase their spelling performance.
3. Allow students to reduce organizing and rewriting time.
4. Allow students to be encouraged to write by increasing their motivation.

III. PROGRAM RESOURCES

A. STAFFING

The Project BEACON staff work as a team in achieving project activities. The Elementary Principal and Project Director, Gary Honken, is the chief facilitator, assisted by the Technical Director, Suzan Sollie. Honken and Sollie have effectively departmentalized their roles into administration and technical supervision respectively, with both participating in the demonstration/dissemination activities. The project staff funded by the Demonstration Grant include a full-time Computer Programmer/Maintenance Contact, Jay Koutavas, and several part-time staff: a Secretary/Tour Contact, a Computer Classroom Teacher Assistant, a Keyboarding Teacher, and 2 clerical data collection/input positions.

The four BEACON components are each led by a key district staff person assigned to these activities: Computer Classroom, Sara Duden; Writing Project, Lillian Robinson; Community Resource File, David Sparks; and Special Education, Linda Wintz. Although each of these key people have their own specialty, each knows enough about the others' areas of interest to represent the project effectively. This interchangeability is achieved through frequent informal communication. Honken encourages participation in the decision-making process at all levels. The staff are not equals, but all staff members have a sense that they are important to the running of the project and that they have access to the decision-making process.

B. FINANCIAL SUPPORT

The major source of support for Project BEACON is provided by the Blue Earth-Frost School District. The district general fund provides the project with a budget for capital outlay, equipment, and remodeling, as well as tenured staff support. Additional revenue is provided by state high technology training and planning aid funds. Chapter two funds were used to purchase the expanded Corvus local area networking system in the high school and support in-service training in computer awareness and software review. The community fundraising effort generated approximately $68,000 for a three year period to fund the computer coordinator position; the coordinator also serves as the Technical Director of Project BEACON. The project staff have established a systematic procedure for acquiring free and reduced price software from several commercial publishers. Through all of these efforts, the district is matching local sources of funding to the technology demonstration site grant.

C. PROGRAM PLAN, TARGET POPULATION, AND BENEFICIARIES

The focus of the Blue Earth program plan was to demonstrate innovative technology applications which address the practical needs of students, teachers, and the community. As one of the school board members stated, "I see Project BEACON as a vehicle for our students to broaden their horizons in the age of technology". The emphasis was to bring technological research into practice, i.e., linking keyboarding and word processing instruction with writing skills, and linking the educational and community resources together in a computerized library database management system. The program plan also extends the research to an experimental fourth grade classroom where each student is provided with his/her own computer to use in a wide range of learning situations wherever the computer is the most effective tool. The special education plan merged the resources, materials, and expertise of the elementary and secondary high school departments with equipment and software to improve the individual educational objectives for these students. To achieve this plan, the district expected to implement: Two elementary computer labs (one specifically for the computer classroom), two secondary computer labs, two community resource databanks located in the elementary and senior high libraries, and a merged K-12 special education department. All computer equipment would be connected through a local area networking system using Corvus hard disks.

The planned target population and potential beneficiaries of the demonstration site project included the students, staff, and the entire community of Blue Earth. While students in grades four, eight, and special education would be more directly involved with the educational technology uses during the 1984-85 school year, all K-12 students and staff could access the community resource file and library database system. Parents, community business people, and other surrounding districts would have an opportunity to participate in ongoing computer education training. A long-range goal was to provide growth and direction for southern Minnesota residents interested in technology-related educational and career opportunities.

IV. PROGRAM IMPLEMENTATION

The BEACON project is approximately eighty percent implemented in November 1984. Implementation consists of:

A. COMPUTER CLASSROOM

The 4th grade computer classroom began classes on August 13, 1984; this was two weeks earlier than the regular elementary schedule to allow the students to learn keyboarding and other essential skills. The class of 26 students, 13 boys and 13 girls, is taught by Mrs. Sara Duden, assisted by Mrs. Cynthia Peterson. This class was randomly selected from the fourth grade and represents all achievement levels. The classroom was remodeled to give students room for their individual Apple IIe microcomputer and a workspace. The students' computers are linked together with a local area networking system, as well as having stand alone capability. Students spend approximately 40-50% of each day using the computer with software that supports the established curriculum in reading, language arts, math, and spelling. The teacher also used a computer linked to a 45" TV screen for demonstration purposes.

In mid-November, the second computer classroom objective was fulfilled with the implementation of computerized individual education plans listing instructional objectives for each child in the class. Software, the third objective, was reviewed and selected over the summer to correlate and enhance the curriculum, and to work on the Corvus network system. The project director indicates that continued growth and development of software, especially in social studies and science, is still needed for the computer classroom. The next objective, keyboarding instruction, was taught the first two weeks of school with continuous reinforcement. There will be quarterly testing of student performance in keyboarding skills. Objective five, videotaped lessons, has not been implemented yet; brackets for mounting video monitors have not been delivered.

B. SPECIAL EDUCATION

The special education departments of the elementary and secondary schools were merged into one department during the summer to provide the most efficient utilization of resources. High technology equipment available to the special education staff includes: five computers, two printers, voice input module, speech synthesizer, audio/video cassette recorders, and language masters. Approximately 95 special education students in elementary, secondary, and speech programs will benefit from these technologies. Interviews and observations with staff indicate that implementation of this activity allows the staff to plan more individualized activities and that technology use provides increased motivation toward learning for students.

The development of a computerized behavior management plan for students was the second objective for special education. This is beginning to be implemented with 2-3 students on a pilot basis this fall. The program, Maturity Actions Profiling System, allows monitoring of student behavior on prepared and open-ended teacher observations. The last objective to implement individual education plans for special education students was started in mid-November using the Sysdata Educational Management Software package.

One interesting special education innovation is the idea of the staff issuing a "computer license", similar to a drivers license, to students who complete a checklist of computer capability items, i.e., how to turn on the Apple, boot a disk, and follow computer directions. It should also be noted that the special education department has fostered inter- district cooperation and awareness of special education technology applications because of its role in the South Central Special Education Cooperative and its participation as a demonstration site. Principals from six of the Special Education Cooperative school districts have visited the project this fall.

C. WRITING THROUGH WORD PROCESSING

The eighth grade English composition class was implemented this fall using the established curriculum, but utilizing the computer lab and word processing and keyboarding programs to support the creative writing process. All 46 eighth grade students are enrolled in one of two sections of the class taught by Ms. Lillian Robinson. Twenty-four Apple IIe computers and 2 printers are available to the participants. Students had two weeks of Corvus networked keyboarding and word processing instruction with "The Correspondent" program in September. The students enter their compositions into the computer with the teacher assisting them with sentence and paragraph development. Objective two, the use of a computerized dictionary-spelling program, is not in place yet. The final objective of this component was to manage student time more effectively by reducing organizing and rewriting time. Preliminary teacher and student reports indicate that compositions are finished more quickly and require less teacher time to grade.

D. COMMUNITY DATA BASE SYSTEM

The community resource file and library database system is further ahead than was anticipated by November 1984. The computerized resource database concept is the unifying component in the technology utilization plan in the Blue Earth schools. The database links the resources of the special education department, the elementary computer classroom, and the secondary writing classes.

After reviewing last spring several automated library systems for inventory, circulation, and resource files, David Sparks, Media Specialist, chose "The Computer Catalog" software system. An inventory of all human and material resources (books, films, audio, video) in the elementary and secondary school was accomplished prior to the end of the school year. Over the summer, the entire resource inventory of 28,000 titles was entered into the library database system which has a total capacity of 60,000 items. This system comprises the computerized community resource file which is located in both the elementary and high school libraries. The resource file, unlike a manual library card catalog system, can provide instantaneous search and retrieval of information by title, author, or subject.

A second planned use of the database system is to implement a library circulation system. The circulation software is ready, but the bar code labels and reader have not arrived. The district expects to have the library circulation system fully functioning by January 1985. At that time, students and staff will receive training in the operation of the library check-out system, as well as the potential uses of the community resource file.

V. PROGRAM OUTCOMES

The Blue Earth Technology Demonstration Project has experienced many successes in the first six months of the funding period. The district has hired highly qualified staff people who are very enthusiastic about their roles in the project. Due to the energy, enthusiasm, and motivation of the Project BEACON staff and several teachers who worked over the summer, the four components of the project are demonstrable. The project was opened to visitors on September 6, 1984 with a visit by Governor Perpich. Since that time, 108 visitors have viewed the program.

Project BEACON staff attended a week long technology in-service training prior to the start of the school year. They reviewed curriculum software, developed internal software evaluation processes, organized a technology resource center and software library, and updated their own technology skills. An unanticipated outcome from this in-service was the recognition that software preview time is crucial to quality implementation. The project director made a recommendation to the school board to allow teachers 1/2 day release time, on request, to review software and plan appropriate computer use for their students. This innovation has proved very successful and stimulated teachers to coordinate computer instruction with the curriculum. In the first month of operation, 15 elementary teachers and 14 secondary teachers took advantage of the computer release time. The district provides a substitute teacher for this class time.

Excitement of students, parents, and the community is readily evident. As a result of the publicity regarding Project BEACON, there appears to be a positive feeling about education as a whole in the community. Some of the parents of fourth grade students in the computer classroom have concerns about student achievement and a perceived lack of personal contact between teacher and student. These same parents also stated faith in the project staff and reported that their children were very enthusiastic about school this year. One of the parents said that his son has more confidence in written expression this year after his use of the computer for word processing.

The 4th grade computer classroom students have become sophisticated program participants; visitors to their classroom do not distract them, they respond politely to questions and go directly back to their classwork. The daily exposure to the computer has not dulled their motivation and interest in the technology or the curriculum areas it supports.

The special education department reports experiencing several positive outcomes as a result of their merger into one department. Beyond closer access to special education equipment and materials, the teachers are experiencing "a real exchange of ideas". There is also more sharing of computer software and ideas with regular classroom teachers as the staff unite in the technology focus.

Students in the word processing classes indicate that they make more substantial changes in their writing than when they revise by hand. The teachers report that they spend less time correcting papers, more time helping students on revision, and may be seeing fewer spelling errors among students.

An unanticipated outcome resulted from the library inventory of school resources and the compilation of material resources from all teachers and all grade levels by topic. Access to the database system proved able to eliminate duplication of media used at different levels of the curriculum because teachers can easily see which media have been used previously.

The administration and school board perceptions of the longevity of Project BEACON are unanimous. The program will be maintained within financial limits. The activities of the project are priorities for the district and the concepts will be continued. With continued demonstration funding, the activities of Project BEACON would be expanded to offer a 5th grade computer classroom in 1985-86 and a possible merger of the school library resource file with the community library system.

VI. SYNTHESIS/SUMMARY

The Blue Earth Technology Project is approximately eighty percent implemented within the first six months of the funding period. The program builds on previous programs and activities in the district, demonstrates a school-business partnership, is well managed and staffed by enthusiastic and innovative educators, and offers opportunities for classroom-based educational technology research.

The fourth grade computer classroom is unique. Each student in this class has a computer on their desk to support the teaching and learning process. Blue Earth proposed in their demonstration site grant to offer the computer classroom opportunity to one of the three 4th grade sections this year. The other two sections will have the computer classroom in the 5th or 6th grade. Thus, over a three year period, the district will have an opportunity to study the impact of individualized computer use in education with experimental and control groups of students.

The trend toward school - business partnerships has played a key role in the establishment of the Blue Earth project. Advocates for industry support of the educational system can look to this district as a model. The school system recognized a need for a computer educator to coordinate their varied uses of technology and decided to approach local businesses for assistance. Business leadership developed a three-year funding plan and raised $68,000 to support a computer coordinator. In return, the school computer coordinator offers technology training to local area businesses.

The emphasis on staff development opportunities is another important feature of Project BEACON. The district administration and school board have encouraged the development of computer competencies in all staff through a range of in-service classes and an innovative release time program for teachers to preview educational computer software.

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ST. LOUIS PARK/TOWER-SOUDAN DEMONSTRATION, DEVELOPMENT, DISSEMINATION: THREE DIMENSIONS OF TECHNOLOGY TRANSFER

CASE STUDY

I. INTRODUCTION

The St. Louis Park - Tower-Soudan project is a result of visionary thinking and action on the part of personnel from both districts. Underlying the cooperative effort was a belief that cooperative pairing of urban and rural schools could provide opportunities for both districts and models for others. Leadership from both school districts were interested in the role of technology in education and submitted a joint proposal to serve as a Technology Demonstration Site.

A part of the appeal of the proposal was that the cooperating districts offer a wide contrast of settings in which interested educators could view practices and gain assistance.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICTS

The project is being conducted as a partnership between the St. Louis Park and Tower-Soudan districts. The two districts are distinctly different in their characteristics. St. Louis Park is a school system with 4,750 students from a 10 square mile west suburban area. This district has worked through the enrollment declines of the 1970-80 era; with the problems of closing schools; a mature, tenured, and aging staff; and an aging community. The district also faces a fiscal deficit. Historically the district has been an innovative setting, developing many pacesetting educational practices. The district offers a comprehensive educational setting of life long education, the district has completed a comprehensive planning program, PROJECT '85, and currently is in the implementation/Action Plan phase of that effort.

The Tower-Soudan district is an Iron Range/lake home/rural school system with 470 students and a 1,000 square mile service area. The district is financially secure, faces declining enrollments, and has a 10 percent minority student population.

B. GOALS

The project proposed to carry out three major functions:

1. Demonstrate the applications of technology that are occurring in each district.

2. Develop and demonstrate updated curricular/instructional programs in science, social science, and reading that incorporate the available applications of technology into the teaching-learning process.

3. Disseminate information and conduct professional development activities in technology for interested educators and community persons based on the applications made by the project districts.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

Both St. Louis Park and Tower-Soudan have personnel and administrations committed to the utilization of technology in the educational setting. Both districts have made large commitments of financial resources to purchase technology. St. Louis Park has been utilizing computers, a television production and broadcast studio, a district radio station, and an extensive AV library on a continuing, evolutionary basis for some time. The district has likewise utilized computers for administrative tasks in several ways. A district Technology Utilization Plan developed as a direct outcome of the Project '85 effort. The Technology Plan has subsequently served as a model for other districts. The St. Louis Park district, with regard to technology and program planning, is operating at a conceptual-functional level that is very advanced compared to most Minnesota school districts. Their Project '85 effort included the incorporation of technology into the district as only one of a set of components that are to be addressed. The district considers instructional technology, individual learning styles, cooperative learning, and individualized learning to be a synergistic set of program components.

St. Louis Park has the following computer based learning activities in its schools (the staff is utilizing many of the teacher utilities packages and classroom technology on a regular basis, so this type of utilization is not included):

ELEMENTARY SCHOOLS
(* introductory experiences)

GRADE LEVEL	COMPUTER ACTIVITIES
Kindergarten	*Kinder Keys
	*Friendly Computer
	*Face Maker
	*Moptown Parade
	*TIES LOGO Activity 1
First	Kinder Keys
	Friendly Computer
	Moptown Parade
	*TIES LOGO Activities 1, 2
	*MECC EZ LOGO
Second	*TIES LOGO Activities 2, 3
	MECC EZ LOGO
	*Delta Drawing
Third	TIES LOGO Activity 3
	*APPLE LOGO
Fourth	*Keyboarding
	*MECC Processing Words
	*Bookworm
Fifth	Keyboarding
	*Bank Street Writer
	*TIES Word Processing
	*Spelling Checker
Sixth	Keyboarding
	Bank Street Writer/Spelling Checker
	*EZ Pilot

JUNIOR HIGH SCHOOL

SUBJECT AREA	COMPUTER ACTIVITIES
Math 7-8	Basic Programming
English 7	Word Processing
English 8	Writing Skills Development on Word Processor
Industrial Arts	Computer Aided Drafting
Foreign Language	Drill and Practice
Global Geography 8	Search Project
Music 7-8	Music Theory
LD/BD	Tutorial, Drill and Practice, I.E.P. record keeping
Science 8	Use of Data Base
Phy. Ed. 7-8	President's Fitness Testing Records

SENIOR HIGH SCHOOL

SUBJECT AREA	COMPUTER ACTIVITIES
Art	Camera and Photo Lab Equipment, Video Taped Projects
Athletics	Computer Software for Management Tasks
Business Education	Computer Bookkeeping, Accounting, Word Processing, Dedicated Work Processor, Typing Training
Computer Science	Programming in BASIC, Other Languages
Counseling	Student Helps GIS, MOIS, ACT-Discover
Foreign Language	Computer Drill
Health	MECC Software, Heart Risk, Body Fat, Life Style, Nutrition, Toxis
Industrial Arts	Compugraphic Printers
Language Arts	VCR and other Recording/Production
LD/ED	Programming, Bank Street Writer, MECC Spelling, Grade Manager, VCR recording/Production
Library	Book Inventory
Mathematics	Computer Problem Solving/Demo Programs
Music	MECC Aural Skills Trainer, Music Theory
Science	Special Lab Equipment, Computer Software
Social Studies	History of Computers in Society Unit Grade 10, Simulations
Vocational	MECC Business 1 & 2, Applewriter, Bank Street Writer

Administrative tasks in each of the schools are being handled through the use of computers. Attendance, word processing, and record keeping tasks are typically done in this way.

The St. Louis Park technology program is guided by a twenty member Technology Committee. The committee functions with eight subcommittees: curriculum development, hardware, community relations, channel 22, implementation of the technology plan, inservice, ethics, and human factors. The Technology Committee prepares recommendations about technology to the administration and to the board of education and monitors implementation decisions. The district also has curriculum development committees working in subject areas. These committees are considering the integration of technology into those subject areas.

Tower-Soudan has established two computer labs in the high school and one lab in the elementary school. The special education area has three microcomputers for dedicated use. The labs are for multipurpose educational applications. The secondary school labs are utilized in support of computer literacy experiences, word processing, computer programming, and software utilization in content areas. The elementary lab is utilized in support of Logo activities and software utilization. The special education area has three dedicated systems in support of their drill, practice and tutorial needs. Recently a committment to adopt the IBM "Writing-to-Read" program has been made.

Individual stafff members from both districts have developed considerable skill in using technology in their work and are prepared to assist others based on their experiences and application.

III. PROGRAM IMPLEMENTATION

Staff members from the two districts that are involved with the demonstration project have met at both sites to discuss the implementation of the grant.

Demonstration Activities

High technology application settings in both districts are available for visitation by educators from Minnesota's schools. Staff members are prepared to demonstrate and consult with visitors. Up until this time there was no systematic plan for reaching interested parties who may be interested in visiting the demonstration activities. Awareness workshops being sponsored by the Department of Education and the ECSUs have provided a level of awareness to area educators, but other outreach has been minimal.

Development Activities

The development of curriculum in the areas of science, social science, and reading into which will be integrated state-of-the-art educational technology is primarily an activity of the St. Louis Park district. Curriculum development teams in these three curricular areas will be assisted by the project staff, Tower-Soudan staff, and other associates in considering suitable topics and uses for technology. The curriculum development process is that normally used by the district. The technology staff will use a three level approach to assist the curriculum development team: 1. Based on a review of the scope and sequence developed, the technology group will identify software and applications that are known to exist and appear to be related to the proposed curriculum (clearly the curriculum development team will also contribute to this effort based on their expertise and experience).

Development Activities (continued)

2. The curriculum development team will identify topics about which they hypothesize that technology can be of assistance. The technology group will assist in a brainstorming effort to develop or determine the feasibility of a technological application in the topic area. 3. The technology group will suggest potential applications of technology in the subject matter field to the curriculum development team based on their view and expertise concerning educational technology and its potential.

Dissemination Activities

The St. Louis Park district and project have developed a sequence of special workshops/events around topic themes that will be offered during the project year. They are:

Technology Fair
Computers in Community Education
Automation/Robotics/Employment Workshop
Teleconference Workshop
Science/Technology/Business Education in Senior High Schools
Summer Computer School for Teachers

These offerings are being developed in several program areas and directed to both general and targeted audiences. The project will respond to requests to make site visits to observe selected applications of technology or requests for consultations about applications.

IV. PROGRAM OUTCOMES

The St. Louis Park district has available listings, by program center and by program fields, of technological applications being made in the district. Documentation supports that the adoption of technology to educational purpises began with interested personnel developing and using technology within their field. As systematic planning and the growth of technology became a major effort in the district, documents show that the district systematically addressed the comprehensive use of technology in eduation as a subset of issues to be addressed in the development of school programs for the furure. A plan and financial committment for large scale implementation, review and evaluation, revision, and updating and replacement of equipment and software was developed as a part of a larger planning process, Project '85. The district has contracted for and received an external evaluation of the computer literacy status of its faculty and an evaluation of computer implementations at the third grade, fifth grade, and tenth grade levels. The evaluation finds the staff well along in its computer literacy and the three grade level programs to be effective with students.

Tower-Sudan also has its developmental history of having a group of staff members having an interest in computers and other technology. Three years ago, under a new administration, a committment to technological applications in education was made. Two computer laboratories having a total of 40 units were established in the secondary school and recently a lab of 20 units was established in the elementary school. The secondary school labs were utilized in support of computer literacy experiences, word processing, computer programming, and softwared utilization in content areas. The elementary

lab is utilized in support of Logo activities and software utilization. The special education area has three dedicated systems in support of their needs. Recently a committment to adopt the IBM "Writing-to-Read" program has been made.

Staff member from the two districts have met at both sites to discuss common issues and to explore for areas of mutual assistance. At this time, training in the Quill project procedures for a Tower-Soudan teacher has occurred as a part of training for St. Louis Park staff, a Tower-Soudan teacher will be receiving training in the IMB Writing-to-Read procedures and may serve as a turnkey trainer for St. Louis Park staff, a special education director may serve both districts utilizing an electronic mail link to assist with the task.

The project initially was proceeding on the assumption that interested educators knowing of the Technology Demonstration Sites would initiate requests to visit or confer with the project regarding their needs. Visitations or local site consultation would then be arranged. The project now recognizes that it must aggressively advertise its range of capabilities to demonstrate technological applications. As a result of this new direction, the project is now preparing brochures that list the many applications that can be viewed in place. This material should be finished and disseminated by January, 1985. At this time, eight group visitations have occurred or are scheduled to occur.

The St. Louis Park district and project have developed a sequence of special workshops/events around topic themes that will be offered during the project year. They are:

Technology Fair
Computers in Community Education
Automation/Robotics/Employment Workshop
Teleconference Workshop
Science/Technology/Business Education in Senior High Schools
Summer Computer School for Teachers

The first three workshops have been conducted at the St. Louis Park site. The Computers in Community Educations workship is scheduled to be repeated at the Tower-Sudan site.

The St. Louis Park curriculum development effort in the areas of science, social science, and elementary reading is progressing according to the timeline established for that effort. At this time, activities designed to incorporate technology into the curriculum being developed are waiting on the development of the initial scope and sequence documents. The curriculum development activities are scheduled for completion by June 1985.

V. SUMMARY

The unusual cooperative-joint effort of the St. Louis Park and Tower-Soudan school districts provides the potential of a unique contrast of Technology Demonstration Sites for interested school districts to visit. The St. Louis Park district is relatively very advanced in its use of technology. This is in part due to its location, but also due to early efforts on the part of interested individuals in developing uses of technology in education. Tower-Soudan also had its forerunners. Because of the size of the faculty and the distance from technological centers, development was necessarily limited.

The districts are willing to demonstrate the applications of technology that are occurring in their sites. Initially they expected that the general awareness on the part of educators of the Technology Demonstrations Sites would be sufficient to bring large numbers of visitors to the sites. The project is now aware that educators expect rather complete descriptions of the educational practice that can be visited at the demonstration site before they will consider a visitation. Brochures for this purpose are being prepared at this time.

The St. Louis Park curriculum development effort that will integrate state-of-the-art educational technology has begun. The technology integration activities are waiting on the development of the initial scope and sequence documents by the curriculum development teams. The resulting curriculum is scheduled for completion by June, 1985. Curriculum integration of this type is unique and represents a needed step in the evolution of educational technology utilization.

The project has scheduled a series of six technology related workshop/conferences during the project year that are targeted at differing consumer groups. It is hoped that agressive dissemination of the remaining events will draw large audiences. In part, this will be assisted by educators and local districts having clarified their needs and approaches to adopting technology.

While real cooperation between the districts has been slow, districts are beginning to consider realistically the potential advantages of the suburban-rural pairing. The replication of a St. Louis Park workshop at the Tower-Soudan site, the Quill training, the possible "Writing-to-Read" adoption, and the consideration of a shared special education administrator utilizing electronic mail are examples. This could possibly be a first demonstration of services to remote, rural school districts through high technology. The possibility of such services has often been proposed in the literature.

DM:lmp:S118c
01/04/85

EAST CENTRAL MINNESOTA EDUCATIONAL CABLE COOPERATIVE (ECMECC) CASE STUDY

I. INTRODUCTION

The ECMECC project, a seven-school-district consortium utilizing two-way interactive cable television for shared instruction, has been designed to demonstrate: curriculum enhancement, interdistrict cooperation and sharing, community services, staff development and inservice training. New courses have been made available to students and residents through interactive cable television during the 1984-85 year. School districts have worked closely together for mutual benefit of students, many staff have received training in new technologies, and significant efforts to share information about the project have been undertaken.

II. PROJECT CONTEXT

A. DESCRIPTIONS OF THE DISTRICTS

The seven member districts serve all or part of Benton, Chisago, Isanti, Kanabec, Mille Lacs, Morrison, Pine, and Sherburne counties in east central Minnesota. The total population of the seven districts is about 57,000 residents. The combined student population is almost 12,000 students. All the schools are located within 25 miles of Cambridge, the headend or central transmitting/receiving point of the system. The districts and their enrollments/teaching staffs are: Braham (1000/73), Cambridge-Isanti (3500/220), Milaca (1600/92), Mora (1600/89), Ogilvie (650/46), Pine City (1400/84), Princeton (2700/150). The community of Ogilvie and, hence, the school district is not cable-wired, preventing their participation in two-way interactive classes. A decision will be made by the Ogilvie Board in 1985 about constructing a transmission/reception tower.

B. NEEDS--NEEDS IDENTIFICATION

Four years ago a Cambridge media specialist became interested in cable TV and its potential for education. By becoming involved in the area's cable commission, a cooperative agreement was made among schools and the cable company, East Central Minnesota Cablevision, which promoted educational uses of cable for each community and under which service would be provided free to the schools.

Each school district with cable has been equipped with an interactive ("B"-loop) 35-channel capacity cable which is used to provide interactive instruction. A school district may expand its in-district network to include several school sites.

From the project's inception in 1980, school superintendents were actively involved in system planning; they felt the educational opportunities for enhanced curriculum outweighed any potential financial risks. Principals and teachers were also involved in planning. Principals were asked to participate in analysis of student and curriculum needs. Advisory committees in several districts (composed of parents, teachers, and other residents) were encouraged to help define the needs and opportunities of the cable venture. Community Education Directors and their Community Education Advisory Committees worked together to identify needs and develop criteria for community education programming. After the initial planning and commitments

were made, student councils were asked to comment on the curriculum planning. All superintendents and principals indicated that their primary interest in the project was to ensure that all students had equal opportunity for essential educational experiences. Their next concern was for complete and appropriate training for the staff who would teach on the system. This was essentially begun with the ECSU's Bush Grant for training. The last identified major need was for coordination of the project, its technological components, and its school and community relations. The consortium hired a director for these purposes one year before the first classes were taught over the system, and prior to the award of the TDS grant.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

1984-85 is the first year of interactive cable operation in the schools. Microcomputers have been used for computer-assisted instruction, business applications, attendance systems, elementary enrichment labs, special education, form management, word processing at the high school level, and reporting purposes in many of the schools. The Technology Demonstration Site grant allowed the hiring of a computer coordinator to give overall direction to these programs and to provide staff awareness/inservice. Satellite programming has been experimented with at Westview High School in Braham. Other technology uses include limited television studio production, teleconferencing between Cambridge-Isanti and St. Cloud State University, video tape, and robotic welding at Pine Technical Institute.

D. GOALS

The TDS application proposed three major goals having five sub-component parts. The major thrusts are in interactive cable, computer, and satellite programming. The obligation to carry out demonstration/dissemination efforts is not listed as a goal, but is recognized as a major commitment.

Goal 1 (Interactive Cable). (A) Two-way interactive cable TV will be used to expand, enhance, and enrich curriculum. (B) It will be used as a vehicle to facilitate resource sharing and communication among teachers, administrators, students, and community residents. Criteria for success include: (1) training and inservice for staff, (2) hiring a director, and (3) coordinating the cable activities.

Goal 2 (Computer). (A) Computers will become an integral part of the educational process. (B) Teachers, students, administrators, and community residents will be provided with the opportunity to gain knowledge of computers. Criteria for success include: (1) hiring a coordinator, (2) providing training or inservice for staff, and (3) coordinating the computer activities.

Goal 3 (Satellite). (A) The potential of satellite television programming will be explored to provide instructional assistance for students, teachers, administrators, and community residents. Criteria for success include: (1) sharing satellite programming from existing systems in Cambridge, (2) examining available programming and copyright limitations, and (3) inservicing staff regarding available programming.

III. PROGRAM RESOURCES

A. STAFFING/RESOURCES

The 1984-85 budget provided for a full-time Project Director, a full-time technology coordinator (computers), a part-time secretary, and seven part-time facilitators (one at each site). In addition, monies have been allocated to staff training, and for purchase of classroom interactive TV equipment (approximately $10,000 per classroom).

This equipment is in addition to the institutional receiving and transmitting equipment at an average cost of $53,000 per site.

B. FINANCIAL SUPPORT

The $125,120 Technology Demonstration Site grant represents a rather small part of the total revenues of the ECMECC project. Other revenue sources include a 1983-84 Capital Outlay set aside of $220,000 and a 1984-85 Inter-District Cooperative Aid Levy of $350,000 ($50,000 per district). This does not include the substantial equipment and engineering contributions of East Central Minnesota Cablevision. Total system costs are in excess of $700,000.

TDS grant funds have been expended for personnel, equipment, curriculum development, demonstration/dissemination and teacher training. The grant was received by the consortium and each participating district received a check for $15,000 for application to project expenses as individually appropriate.

Given this level of expenditure, there is no question the system would have proceeded without the TDS grant. These funds allowed the consortium to jointly hire a full-time computer coordinator for software review and staff inservice. The grant, moreover, allowed consortium staff to continue their active sharing of information to other schools, sharing which would have been financially prohibitive without external funding.

C. PROGRAM PLAN

The major components of the program plan included hiring a director to implement the technology, coordinate the grant, develop the inservice training plans, and coordinate the interdistrict relationships necessary to provide two-way interactive cable television. The grant placed additional requirements of demonstration and dissemination on the ECMECC project. Two weeks of teacher training over the summer provided 20 instructors with hands-on experience with the interactive cable instructional delivery system. It was partially funded by a Bush Grant inservice training awarded to ECSUs 5 and 7.

The first technical problems to overcome, transmission and reception, were solved in part with the work done by the cable company. Design of the classrooms was the major responsibility of the director. More than six months of design, planning and development went into the prototype. (The director recommends that any other district wishing to replicate such a system plan 18 months to two years from the initial agreement to the first televised interactive classes.)

The technology (computer) coordinator spent several months planning the multi-district inservice training and hardware/software coordination effort to be carried out in 1984-85. Satellite programming received much less attention initially because of the time devoted to the interactive cable preparation and the demonstration/dissemination effort.

D. TARGET POPULATION

The ECMECC project has identified all 12,000 students enrolled in member schools and 57,000 area residents as potential recipients of the educational programming delivered by the interactive network. High school students are taking advanced, low-incidence courses; and, a number of adult education classes are being taught interactively. Satellite programming will become available for cablecasting to all cable subscribers.

IV. PROGRAM PROCESS

A. IMPLEMENTATION

After several technical and construction delays, six classrooms (one in each district) are operating. They were completed as late as eight weeks after the opening of school. Each classroom has three cameras and seven monitors, a successful design according to both teachers and students. This arrangement eliminates the need for a camera technician because the teacher can easily switch the cameras by using podium-mounted pushbuttons. Technical problems have been encountered in picture quality, teacher sound, camera background, student sound, video burn, and audio feedback. These are being corrected at minor capital expense. Other associated problems include the delay in exchange of class papers. An investigation into facsimile transfer equipment is being undertaken in hopes of remedying this problem.

The ECMECC technology (computer) coordinator has conducted four workshops for teachers and administrators on the use of computers in curriculum and instruction. Software evaluation and selection information has been shared with all seven schools. A process to share software among all seven high schools has also been initiated. Various business programs (transportation and food service) have been developed and shared with the participating districts. Other computer efforts in progress include: inservice and support for special education teachers, 1/2-day workshops on computer subjects in each school over Christmas break, investigation of modem linkages to share more software information, work with administrators to explore software support packages, and scheduling the use of the interactive cable system to exchange information with participating districts about computers in education.

The following interactive classes for high school students are in session daily during the 1984-85 school year: Spanish (Braham/Cambridge-Isanti), Calculus (Princeton/Mora, Milaca/Braham), Advanced Shorthand (Cambridge-Isanti/Princeton), Spanish (Milaca/Braham, Cambridge-Isanti), Latin (Milaca/Cambridge-Isanti, Pine City, Braham, Princeton), Speech (Cambridge/Milaca), and College Algebra (Princeton/Mora). That is, a total of six previously unavailable elective classes are provided through the two-way. Each of the six currently participating district is involved in two classes, with the exception of Pine City which has students enrolled only in a Latin class. A total of 162 students are enrolled in two-way classes. Community Education classes utilizing the cable network during the 1984-85

school year represent programs of varied interests: Calligraphy, Coupon and Form Exchange, Creative Dramatics, Introductory French, German, Introduction to Spanish, Swedish, Developing Self-Esteem in Children, What is ECMECC and Two-Way Interactive Television, New Parents, Introduction to Building Construction Technology, Beginning Record Keeping for Small Business, Profit in the Sheep Business, Farm Fuel and Lubricants, Employer/Employee Relations for Small Business, Introduction to Ventilation Systems, Feeding Lambs, Single Parenting, and Income Tax Planning for Farmers. Enrollment data for community education courses are not available as of this writing.

Continuing exploration of the satellite programming possibilities for cable distribution has been somewhat slow given time and resource commitments to the interactive cable, computer, and demonstration/dissemination efforts. This is of concern to the director and technology (computer) coordinator who plan to devote more time to the satellite effort as the interactive system demands less time and as demonstration efforts become less burdensome.

Seven hundred fifty-six visitors have seen the project through December 4. The director and staff made about a dozen off-site presentations to several hundred participants during the fall. The director produces an exemplary newsletter ("ECMECC Cablegram") which is widely distributed within and outside the project. A satellite "Primer" and ECMECC brochures have been printed and are distributed to all interested parties. Plans are underway for a videotape to demonstrate the two-way interactive system.

B. DISCREPANCIES FROM PLAN

The only discrepancy from the original plan is related to the delayed start-up of the system, due to construction and technical problems. The majority of transmission problems have been corrected and the system functions satisfactorily. Two other discrepancies are apparent: (1) Ogilvie School District is not operational, because the community was not sufficiently interested in a cable system to make it economically feasible for the cable company. The district is now considering making the $82,000 investment to become two-way interactive in the ECMECC project. (2) Exploration of the potential for satellite programming to provide instructional materials for students, teachers, and administrators has not been adequately pursued, Plans to expand more effort on this goal have been articulated by the director for the second semester.

C. INTER-DISTRICT COOPERATION

All data suggest cooperation among the consortium has been excellent. For example, all schools adjusted their schedules to accommodate seven-period days; start and end times have been similarly adjusted. Cooperation has also included changes in course offerings, teachers' loads, bus schedules and registration. The project director clearly understands the necessity for information exchange and staff involvement. There can be no question this communication process has been a major contributor to the initial success of this project. Cooperation and communication between boards, superintendents, principals, local coordinators and staff is described as excellent.

V. PROGRAM OUTCOMES

A. OUTCOMES

The ECMECC project is a carefully planned, well-coordinated and successful program. It is clearly developmental, and as such has and will likely continue to experience operating problems. However, given its relative newness, it has been able to demonstrate some significant benefits both to the consortium and to a large number of other educators.

Specifically, six heretofore unavailable elective classes are being offered to 162 students in six school districts (some say seven classes are available given that two sections of Spanish are online). In order to provide these classes, these school districts have made major cooperative efforts in such typically troublesome areas as calendars and school days. The two-way system has also allowed convenient community education programming. Nineteen community education classes are available to residents in the consortium.

The TDS grant has also allowed the schools to upgrade and improve the integration of computers into curriculum. Efforts to provide staff development in computer technology are ongoing.

In a not entirely unanticipated outcome, the project has promoted substantive cooperation among these school districts. Cooperation has involved extensive system and staff development. It is very clear that the member schools feel they share the ownership of this innovative effort. Teachers and principals attribute their positive attitudes and enthusiasm to their early and continuing involvement in planning as well as to the excellent communication among sites.

The exceptions to this successful portrait have been the non-participation of Ogilvie, the limited attention given to the expansion of the project's satellite component and the difficulties caused by the delayed start of classes. There have been concerns expressed that the enormous amount of dissemination effort required have reduced staff time available for continued planning, troubleshooting and quality control.

There have been a few isolated concerns expressed that the system may cause part-time teachers to lose employment opportunities and that teachers had insufficient time to decide about teaching courses on the system. The majority of participants however are enthusiastic. Indeed, two teachers said, "I'll never retire" and "life is a lot more fun" when asked about the project. Administrators unanimously report that interactive TV instruction is "here to stay" and that the districts will continue their support and use of the project.

Their investment has been substantial (nearly 3/4 million dollars committed) and will not be lightly given up. All administrators felt that the expenses are well justified by the expanded educational opportunities made available by the cable system. In the words of one administrator, "We are the largest high school in Minnesota because of the project."

VI. SUMMARY

ECMECC is a 7-school-district consortium which utilizes a two-way interactive cable TV network to provide school and community instruction. The start up was carefully planned and coordinated,.and the project is enthusiastically supported. The inter-district cooperation is described as "phenomenal." It is the perception of several that the TDS grant has "made the difference between what is a successful project and just another project by recognizing its potential." Six high school credit classes have been offered to students who otherwise couldn't have taken them. Nineteen community education classes in 1984-85 provide another avenue for community residents to further their education. The project has been successful and will be continued.

DM:amg:S118d
01/07/85

HIGH TECHNOLOGY COOPERATIVE MODEL FOR SOUTHERN MINNESOTA

CASE STUDY

I. INTRODUCTION

The High-Technology Cooperative Model for Southern Minnesota is designed to connect the computer and cable technology of the Rochester Public Schools with the telecommunications and computer resources of the Austin Public Schools. This cooperative effort is to provide the Austin and Rochester schools and surrounding communities with opportunities to expand and improve their technological capabilities. In addition, the project is designed to assist the school districts served by the KSMQ-TV (formerly KAVT-TV) public broadcast television station.

The project's specific intentions are to provide inservice to area school districts in the instructional uses of technology; to explore and demonstrate the uses of technology (i.e. interactive television, teleteaching, computer networking) in education; and, to plan for the future needs of this region and the ways in which technology can help address them.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICTS

Austin and Rochester have similar and numerous organizational resources and structures. There is a strong commitment to education by businesses such as IBM and Hormel, who use technology and are willing to assist school districts in gaining access to new technologies. Both communities have community colleges and Vocational-Technical Institutes. Both school districts have effective district committees to identify educational needs and examine how technology can be incorporated into curriculum and managerial functions.

The Austin public schools include four elementary, one middle school, and one senior high school. Approximately 1,600 elementary, 1,000 middle school, and 1,400 high school students are served through Austin's programs. The Rochester school district has sixteen elementary schools, three junior high schools, and two senior high schools. There are approximately 6,000 elementary, 2,900 junior high, and 3,000 senior high school students.

Originally the High-Technology Cooperative Model for Southern Minnesota was to serve eighteen school districts, all receiving the KSMQ-TV broadcast signal. These districts included Blooming Prairie, Cannon Falls, Chatfield, Dodge Center, Elgin-Millville, Ellendale-Geneva, Hayfield, Kasson-Mantorville, Lyle, Mankato, Mazeppa, New Richland, Owatonna, Plainview, Spring Valley, St. Charles, Stewartville, and Zumbrota. Recently, the project facilitators have begun mailings to some of the districts now receiving the KSMQ-TV signal by cable and to smaller districts near Rochester they believed would benefit from the computer in-services. These districts are Albert Lea, Byron, Dover-Eyota, Grand Meadow, LeRoy-Ostrander, and Pine Island. The Southland School District has also been added to the list of districts to be served because of their microwave link with KSMQ-TV and the Austin School District.

The enrollment of neighboring districts ranges from approximately 550 to 6,000 students. There is also a wide range of technological resources available to them. In a needs assessment administered to the 18 original participating school districts after the grant was awarded, the Austin and Rochester project staff learned that school districts had as many as 84 computers and as few as ten and had from 40 to 900 educational diskettes. All sixteen respondents reported having at least one teacher capable and willing to conduct in-service training.

B. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

For a number of years teachers and administrators in the Austin and Rochester school systems have used a variety of emerging technologies for classroom instruction and management of district operations. Computer science has been a part of the curriculum at Austin since 1970. Computer labs in the high school and the middle school are used in science, mathematics, and career-planning courses. Microcomputers in the elementary schools are being used for classroom instruction and to maintain student records. KSMQ-TV, located in Austin, provides instructional programs free of charge to schools within the broadcast area. Many educational series are stored on tape and are available from the ITV library located at the Vocational-Technical Institute. KSMQ's satellite dish can also receive the Public Broadcasting Service network programming and national and international teleconferences. Recently, the KSMQ facilities have been used to connect the Austin and Southland high schools to provide Southland with an introductory Spanish course.

Half of all Rochester elementary schools, kindergarten and first grade students use microcomputers, typewriters, and tape recorders in the "Writing to Read" program. Because this year's pilot test was successful, this program will be used in all elementary schools next year. Approximately one-half of the sixteen elementary schools have fifteenstation microcomputer labs. The other schools have access to a traveling microcomputer lab equipped with Apple IIe computers. This lab provides computer experience for students and teachers until the district has funds to equip each elementary school with microcomputer labs. Some special education instructors are using the computer for tutorial activities. Jefferson Elementary School has a programmable robot.

All three junior high schools have fifteen-station Apple IIe computer labs. Industrial arts, home economics, foreign language, mathematics, and English teachers have access to both district generated and commerical software. At Kellogg Junior High School, one class of 8th grade accelerated math students and another class of 9th grade students receive algebra reinforcement through a local area network/Corvus hard disk. Both of the senior high schools have three individual microcomputer labs. The business education departments use fifteen IBM Personal Computers for accounting, word processing, data base management, and spread sheet instruction. Students also have access to Display Writer.

The mathematics departments use IBM PC Jr's to teach Basic and Pascal. The third set of computers, Apple IIe's, are used by language, government, and special education teachers. An hourly attendance package, developed by the district, is being used in both senior high schools. A daily attendance package is being developed for the junior high and elementary schools.

In addition to its computer facilities, Rochester has a closed circuit television production studio used for informational and instructional programming. Schools within the district are also connected by the Group W Cable franchise.

C. PROGRAM GOALS

The High-Technology Cooperative Model for Southern Minnesota has four objectives:

1. To provide timely and ongoing in-service for the eighteen school districts within the viewing area of Channel 15.

2. To explore the use of innovative technologies in education; i.e., interactive video, teleteaching, data transmission, computer lab resources, and teleconferencing.

3. To make available present technology applications for improvement of instruction in participating districts.

4. To plan effectively for future needs of the region and determine how technology may meet them.

III. PROGRAM RESOURCES

A. STAFFING

Mahlon Wissink, Coordinator for Science, Math, and Technology for the Rochester School District, serves as Project Director. The Assistant Project Director is Barry Baker, Director of KSMQ-TV in Austin. Each district has a project facilitator to assist in program planning and inservice delivery. Marilyn Flack, Instructional Television Coordinator at KSMQ-TV, serves the Austin district. Her counterpart in Rochester is Paul Gustafson, mathematics instructor on leave from Willow Creek Junior High School.

B. FINANCIAL SUPPORT

Major funding for project activities has come from three sources, the original state grant of $125,120 and the Austin and Rochester contributions of $35,000 per district. The Minnesota Department of Education also allocated additional funds for in-service travel costs thereby freeing up funds for the project to purchase additional hardware and TV equipment.

Group W, the Rochester Cable franchise-holder, is providing towers for the microwave system. In addition, the Hayfield school district is exploring the possibility of establishing a cable link between the Hayfield tower and the high school. The Southland and Austin School Districts and KSMQTV supported the point-to-point microwave link. This link can be demonstrated as a feature with high potential for the area, but equipment purchases were not provided by grant funds.

IV. PROGRAM IMPLEMENTATION

OBJECTIVE 1

The first project goal is to provide timely and ongoing in-service for the eighteen school districts within the viewing area of Channel 15. As discussed earlier, the project facilitators now include seven other school districts, or a total of 25. The original idea was that individuals from other school districts should have an opportunity to participate in in-service opportunities already available to Austin and Rochester staff.

The four activities below were specified in the original project proposal:

1. In-service courses originating either in Rochester or Austin, broadcast over public television station Channel 15 and available to both communities over the air or through community cable services. The Rochester in-service curriculum will be used for instruction and new courses developed based on needs identified by participating districts.

2. Onsite in-services will be provided by teachers who have successfully used technology in their classrooms to provide the practitioner with examples of high success programs.

3. Rochester IBM onsite lab visits will be scheduled as follow-up or integral part of in-service for the regional area.

4. Video tapes will be produced showing minorities and women, and men in nontraditional jobs. The tapes will also include discussion by them of their perspectives during their school years, and as workers in industry.

In writing the proposal, project developers were aware of in-service needs through their contact with district curriculum committees. The activities were designed to incorporate technology into the classroom by making teachers aware of what is available and how to use it. In-service was to facilitate widespread integration into the total curriculum and correct a situation where the technology use was concentrated among a few highly motivated teachers. Developers proposed that teachers possessing technology skills become the in-service instructors. They also proposed providing other districts access to the in-service opportunities.

After the grant was awarded, the staff held informational meetings in Austin and Rochester and invited the 18 targeted districts to attend. At these meetings, project staff requested volunteers for an advisory committee which would meet quarterly. Six individuals volunteered representing the districts of Kasson-Mantorville, Pine Island, Elgin-Millville, Blooming Prairie, Owatonna, and New Richland. Individuals on the committee represented a cross-section of district sizes and professional assignments. At the second meeting the advisory committee suggested the project provide in-service on specific pieces of software which teachers could apply directly to classroom situations. The advisory committee also directed the staff to develop an informational video about the project. A fifteen-minute video is currently available. A half-hour video is in the process of being completed for showing on Channel 15.

A needs assessment dated May 7, 1984 was sent to the 18 original school districts. This survey gathered information on software, computer, and staff resources available in each district. The districts were also asked to identify the kind of technology-related training most needed by their teachers, the software they would like to purchase, and how the site can help their district.

Presently, the majority of the in-service being provided and advertised is not being broadcast over TV or throughout the cable the cable system. According to the Project Director, this type of in-service will be provided in the future. An example is the planned broadcast of a video for school staff working with chemicals to fulfill the Employee Right to Know requirements of the state.

The project staff originally planned to open up the in-service being provided for Austin and Rochester staff. Wording of activity number one in the proposal clearly shows that the Rochester in-service curriculum would be the basis of instruction and that new courses would be developed based on an area needs assessment. Because response to in-service offerings was insufficient to justify presenting the courses, project staff decided to alter their outreach approach. Districts can now request that project staff come to work with the district in its local setting.

One in-service is being provided in Rochester on Metafile. This course evolved from teacher requests and without advertising had such great response that two sessions were necessary to accommodate the demand. Participating teachers in a variety of curricular areas come from the Pine Island, Stuartville, Spring Grove, and Rochester School Districts. In addition, participants are coming from Mankato's AVTI. One section will be provided at the Rochester IBM lab and the other at the Rochester AVTI. The Rochester project facilitator believes this in-service caught on so rapidly because of genuine need. He feels if the project staff can identify such specific needs, they will be more successful in attracting participants for future offerings.

Austin plans to begin providing in-services the last part of November or the first of December. They have been in the process of remodeling their lab and purchasing computers and software. The remodeling has been completed and the computers are being set up. They are in the process of planning two in-services: one on word processing and the other on Appleworks. Gary Knudson, Computer Science Instructor, reported that four districts have requested in-services for their staff when the lab becomes operational. These school districts are Freeborn, Lyle, Blooming Prairie, and Southland.

The project staff emphasized that the in-services being held at Rochester and Austin will provide districts with options. In some cases, they may offer parallel courses so a district can send their staff to the one most convenient. Recognizing the expertise in certain technologies each district has developed, they plan that districts will send staff members for training in a specialized area. For example, for interactive and instructional television, a district could utilize the expertise in Austin. If a district needed assistance in computer management systems, wanted to learn about a hard disk system, or desired training on using cable for instruction, they would work with the Rochester staff.

The staff reported frustration that districts have not taken advantage of the services they want to provide. They attribute their inability to attract participants to in-service offerings to the districts being unaware of the resources allocated in the grant to in-service for other districts. They have noticed a marked increase in requests since the ECSU information meetings on the technology demonstration projects, but were disappointed more districts were not present at the Rochester ECSU meeting. The project facilitators are considering alternative ways to provide in-service and to reach nonparticipating districts. These include sending the project newsletter to the district computer and media contacts in addition to the district superintendent who received past correspondence. They are also considering making personal contacts with other districts. One advisory committee member told the evaluator she felt the personal contact may be an appropriate vehicle to notify other districts of the services. All three advisory committee members interviewed reported that it is also up to nonparticipating districts to make their needs known. Two members felt the project staff is trying very hard to provide this service.

Project staff are still planning to have teachers who have successfully used technology in their classrooms provide in-services. These individuals were identified in the grant. Through the needs assessment, teachers in other districts were also identified. According to the Project Director, the grant will enable Rochester to use people outside the district as in-service teachers. Previously, only individuals from the Rochester district could provide district in-services. The Austin computer science facilitator is planning to make the Austin lab available to other districts' computer contact person for in-servicing their district staff. He believes this would provide district participants with an in-district contact for computer problems.

To assess the districts' perceptions of the project, the evaluator conducted telephone interviews with a random sample of school personnel of the original 18 districts. Nine individuals were interviewed, three from the advisory committee and six from the other targeted districts. All except one reported receiving ample information from project staff. Two advisory committee members said another factor and not lack of interest motivated their decision not to attend the two advertised in-services. Three other districts said they were aware of the in-services but chose to encourage staff to use their limited in-service days for other priorities. A number were interested when they learned from the evaluator that the project staff were willing to come, free of charge, to their districts with in-service programs and software. Four of the six districts not represented on the advisory committee responded that they were keeping abreast of project events but were waiting to see what happens. Of the nine districts surveyed, five reported that they were very interested in the microwave system. They see it as a potentially useful tool for providing state mandated language classes and enrichment opportunities.

Rochester project staff and the district's Title IX coordinator are exploring potential scripts for video tapes that would show minorities and women in nontraditional jobs. One idea is to develop a video from interviews collected with local women in their work setting. These interviews would focus on interviewees identifying factors that facilitated their getting into nontraditional fields.

OBJECTIVE 2

The second objective calls for project staff to explore the use of innovative technologies in education. Austin and Rochester School Districts will be direct beneficiaries of the purchase and implementation of new technologies. Indirectly, other districts will benefit through visitation to the site and through in-service offerings. In the future, other districts may benefit directly from the microwave technology that could be used to provide language courses to meet potential state regulations or to gain access to enrichment courses.

The specific activities proposed in the original project proposal to accomplish this objective were:

1. Curriculum committees consisting of representatives of all subject areas will determine appropriate use of technologies.
2. Evaluation through ongoing communication with regional businesses and industries the types of teleteaching, data exchange or teleconferencing that is needed.
3. Current computer labs in Austin and Rochester will be provided with state-of-the-art equipment to better service K-12 students and staff.

In recent years curriculum committees in both Austin and Rochester have been directed to examine technology resources and determine how they can be incorporated into the curriculum. In Austin, these committees work directly with KSMQ's Instructional Television coordinator to identify instructional television programs that can be used. In both Austin and Rochester the committees examine microcomputer and video resources.

The Project Director and Assistant Project Director have business advisory committees. The purpose of these commitees is to examine how the schools and businesses can share resources. Recent discussions have focused on business and industries' needs in the areas of teleteaching, data exchange, and teleconferencing.

Computer labs in Austin and Rochester have been updated. In Austin, grant and district funds were used to purchase Apple microcomputers for the remodeled lab.

Rochester used its hardware funds to review and install a Corvus hard disk system, and Ideal Learning Corporation math software. The system is being piloted in two algebra courses, one class of accelerated 8th graders and another class of 9th graders.

Science peripheral equipment has been purchased and is being used at Mayo High School. A volt meter, a voltammeter, a temperature sensor and photo cell have been purchased.

In addition to purchasing microcomputer technologies, development funds were included in the grant for the production of special needs software. Presently, only a software program for chemistry is in the process of being developed. This contract has been awarded to 4-D Interactive Systems, a Rochester based business. It is currently being reviewed by local teachers. According to the Project Director, other software will be developed once curriculum committees have identified specific software needs. The Austin Computer Instructor said that Austin was not interested in developing software because so much is available commercially.

The other major use of technology planned is the use of microwave to link the Austin and Rochester school systems. The districts allocated $2,500 each to employ Jansky & Bailey Broadcast and Television Consultants to design the system and prepare the specifications for bidding. The equipment has been purchased and delivered to the KSMQ-TV studios, where the consulting firm will test the equipment. The Assistant Project Director anticipates that the system will be operational in June of 1985. A number of factors have contributed to this installation date. First, the Minnesota weather will not enable the system to be installed until spring. Secondly, Group W is in the process of installing an upgraded cable system in Rochester. This will allow for the microwave to be placed on their existing tower. This cannot be done, however, until the old system is replaced so the tower will support the microwave dish. In answering a question about the progress of the project, the Assistant Project Director asserted that installation of a microwave requires study and careful implementation so that the system will be functional for a long time.

State funds are also being used to upgrade Rochester's television studio to enable its broadcast signal to meet FCC requirements. It does not appear, however, that all that is necessary for the Rochester studio to broadcast over Channel 15 will be accomplished in Year one/Phase I.

OBJECTIVE 3

The focus of this objective is to make available present technology application for improvement of instruction in participating districts. Specifically, the project writers planned to accomplish this by establishing software banks in both Austin and Rochester where district and area teachers could evaluate a specific piece of software before purchasing.

Twenty-five thousand dollars was allocated for this activity, $10,000 each from the Austin and Rochester districts and $5,000 from the technology demonstration grant. The Rochester staff has purchased all the state approved software and has published a listing. This catalogue was distributed to districts participating at the Rochester ECSU demonstration site meeting. The Rochester Project Facilitator is considering sending a copy of the software catalogue to other targeted districts.

The Austin software bank is not completely assembled. The software from their library is being duplicated when copyright laws allow. The Computer Science Instructor reported that waiting to establish the software bank will enable Austin to use the state's most recent publication of approved software for software selection. A partial order of software has been placed.

To make the software available to other districts, project staff are providing participating districts with two options. Districts can either send staff to the Austin or Rochester facilities or can request that project staff come to their district with software and, if needed, additional computers.

Recently, Elgin-Millville and Blooming Prairie have requested a software showing. The first came about because of this school district's involvement with the advisory committee. The second resulted from the presentation at the Rochester ECSU conference.

OBJECTIVE 4

The final grant objective is to plan effectively for future needs of the region and determine how technology may meet them. This objective and specific activities can be found in Figure 1.

Project staff reported that this will be a second phase and dependent, although not completely, upon receiving a second demonstration grant. These activities are designed to serve the Austin and Rochester communities as well as identify participating districts' curricular needs and ways to meet those needs.

In some ways, the project staff are already informally involved in Phase II. Project staff meetings have begun to focus upon ways foreign language courses could be provided next fall for interested districts. This dialogue was motivated by two forces. The first is the microwave link between Southland and Austin. This interactive television system is providing a first year Spanish class for interested juniors and seniors from Southland. The class is originating from Austin. A number of small districts have become aware of this project through the advisory committee and the ECSU demonstration site meeting in Rochester. Districts are beginning to ask project staff how a similar service may be available to them.

Discussions have also been held between the Assistant Project Director and officials from the Austin Community College regarding ways the microwave can be used to share resources with Rochester's community college.

In addition project staff are connected in a variety of ways to other community and school committees. This network may be one key to the project achieving its goals in Phase II. These communication links have been in existance for some time and were not developed specifically for this project. This history of interaction provides a framework for dialogue about technology needs and a structure from which ideas for specific ways to meet these needs can evolve.

V. SUMMARY OF OUTCOMES

The state's resources have been used as proposed. The equipment has been purchased and all but the microwave link is operational. It is not appropriate at this point to project final outcomes.

Project staff are searching for alternative ways to provide in-service and to communicate with targeted districts. There has been increased response since the staff revised their approach to providing in-service for targeted district schools. Many of the telephone interviewees said they were interested in this alternative approach. Once other districts become aware of this change, the project staff may receive more in-service requests. Other districts are interested in the microwave link and others are waiting to see what evolves from the project before participating.

FIGURE 1

Planning effectively for future needs of the region and determine how technology may meet them. This second phase of the project will also include exploration of funding from private industry and other grants, districts' funds from participating schools, and revenue from marketing of products developed in the first phase of the project. This planning will involve staff working in close communication with the project steering committee.

Activities to accomplish these objectives are:

1. Planning for use of both districts' technical strengths to provide services to a larger community.
2. Plans for addition of two-way microwave to allow the Austin and Rochester districts to exchange technological concepts, curriculum and instructional programming.
3. Broadcast, cable, closed circuit, and mobile microwave technology will provide opportunities for staff, students, and the communities at large to benefit from this project.
4. Planning to provide services, present only in Rochester and Austin in the first phase of the project, in all participating districts. This could be accomplished with additional equipment, and enable small districts to offer a wider selection of course offerings. Planning will include teleconferencing and identifying the most cost-effective way to deliver these services.
5. Identify curriculum needs of participating schools and determine ways to meet these needs with available technologies.
6. Develop regional resource technology centers at Austin and Rochester to inform and instruct area-wide media directors and/or generalists in optimum use of instructional media. The planning will also address personnel needs to accomplish this.
7. Investigation of technological equipment and personnel to serve business and industry with in-service for professional development. Plan to engage professionals who can work with regional business and industry, serving them with better use of current and proposed technological equipment from Austin and Rochester. Additional discussion will take place with Rochester IBM management to determine what additional services could be provided on a cooperative basis, expanding the present project to Austin and other school districts.
8. Plan to link school district studios at Austin and Rochester with studios at the Mayo Clinic, Rochester IBM, and other facilities available within the two communities such as the May Civic Auditorium.
9. Additional plans will take place using SMECSU services and the committee structure established in phase one of the project.
10. Planning to explore special equipment for homebound students will also be a part of this phase of the project.

There is some evidence that the size of a district generates certain perceptions about other districts. One district superintendent believed an outreach problem was that larger school districts believe they know what smaller districts need. Staffs from larger districts often discussed the problem of expending resources for the development of programs. They argue that small districts often benefit from these programs yet are not willing to assist with the developmental costs. These perceptions can mediate the success of school cooperation efforts. In some ways they result from a lack of trust and limited dialogue among districts. One administrator believes that the technology demonstration sites are helping to promote dialogue at a staff instead of an administrator level. If this is the case, then some of the perceptional and resource problems may begin to be resolved.

One outcome of the project is the establishment of a communication link between Austin and Rochester School Districts at a program versus administrative level. Even though there is some indication that the interaction has been awkward at times, it is possible to see the staff presently drawing upon each other's expertise when needing to answer technological questions. The communication link is also beginning to occur with other districts. Six districts are actively participating in dialogue with the project staff through the advisory committee and through in-services. Another district not on the committee is participating in a cooperative program with Austin through the interactive Spanish class. As the project staff pursue alternative outreach avenues and as the microwave is in place, the interaction and cooperation between districts may increase.

The Southland and Austin interactive Spanish class is one unanticipated outcome. It was not originally proposed but evolved because of Austin's receiving a demonstration grant. This outcome seems to highlight the project staff's commitment to the ideals of the technology legislation and a willingness to expand beyond the boundaries of a prespecified proposal.

A major strength of this project is the staff's expertise. Collectively they are very knowledgeable about cable television, microcomputer, instructional television, and microwave. The Project Director, Mahlon Wissink, coordinated the IMB cooperative project and has a good understanding of the issues involved when integrating microcomputers into an educational system. Barry Baker, the Assistant Project Director, was brought to Austin to develop the KSMQ television station. His counsel is frequently sought by schools who are negotiating with cable companies for services. For example, Mr. Baker was actively involved with helping the Rochester School District negotiate their franchise agreement with the local cable company. Marilyn Flack brings to the staff a wealth of information about instructional television. She also has had past communication with area school districts because of her position as Instructional Television Coordinator at KSMQ-TV. As a mathematics instructor, Paul Gustafson is able to communicate effectively with teachers. He too had limited microcomputer knowledge, but through his own initiative and assistance through the IBM cooperative project has developed extensive skills. Recently, he has begun to develop software for the district and is never too busy to stop and answer a teacher's or secretary's questions.

Another positive force behind this project are the Austin and Rochester Superintendents. They are committed to technology being integrated into the classroom yet knowledgeable of the human resource issues which need to be addressed if technology is to meet student learning needs.

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TECHNOLOGY EDUCATION CENTER - HOPKINS (TECH)
CASE STUDY

I. INTRODUCTION

The Hopkins School District has been recognized for its uses of technology for instructional improvement. The Technology Demonstration grant is being used for purposes of demonstrating district-developed software for instructional management, and for in-service, consultations to teachers and administrators, and organization of mathematics courseware to encourage use/development/delivery of higher order thinking.

The emphasis of the technology demonstration activities is on providing instructional management tools, delivering better in-service training, and developing innovative instructional delivery systems.

The Hopkins proposal and the district's technology plan reflect the district's philosophy regarding appropriate uses of technology and identification of technology needs. It is a decentralized district with a strong committee structure. Much of the district's needs assessment information filters up to the technology staff from those committees.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT

Independent School District #270 - Hopkins also serves parts of Eden Prairie, Edina, St. Louis Park, Golden Valley, Minnetonka and Plymouth. The public school population of approximately 6,700 students is enrolled in six elementary schools, two junior high schools, and one senior high school.

The Technology Education Center - Hopkins (TECH) coordinates programs housed throughout the district. To accomplish this it acts as a clearinghouse for information, evaluation, training, and material acquisition in the area of technology.

B. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

The school district has a long term commitment to using technology in curriculum delivery. The district was a charter member of TIES, one of the first districts to have a full-time instructional computer coordinator, and has employed a full-time programmer/analyst since 1980. The district has been awarded two dissemination and technology training grants from the National Diffusion Network: the Comprehensive Achievement Monitoring (CAM) project and designation as a National Diffusion Network Technology Lighthouse site. Hopkins has developed the Mastery Management System (MMS). The Hopkins School District's student television project (KHOP-TV) broadcasts educational programming. Microcomputers are used for a wide range of administrative functions from budget and attendance to adult class registration. "An Introduction to Computers" was offered by the District's Community Services Department for senior citizens this past year. Introductory computer courses have also been provided to parents. The district also has an internship with Honeywell, Inc. and is exploring the development of a new training program and development of a computer lab jointly staffed by the Hopkins District and Honeywell.

C. GOALS/ANTICIPATED OUTCOMES

The objectives of the TECH project are:

1. To further adapt the district's locally developed microcomputer instructional management system to meet needs for monitoring and reporting student competencies in reading.

2. To integrate higher level thinking skills into the K-8 mathematics curriculum by providing training experiences and software/ courseware materials.

3. To expand the district technology in-service program by providing key teachers and other personnel with information, training, and useable models of instructional strategies.

The project facilitators have added a fourth objective because a large portion of the first objective had been undertaken before the TDS grant was awarded. This objective focuses on the development of instructional delivery systems utilizing video and microcomputer technology. The goal is to use technology to increase student access to quality educational experiences.

III. PROJECT RESOURCES

A. STAFFING

The TECH staff is comprised of: Don Sension, Coordinator of Research, Evaluation, and Information; Ken Corens, Instructional Computer Consultant; John Erickson, Coordinator for Instructional Technology and Director of the National Diffusion Network Technology Lighthouse Project; Pam Askeland, Microcomputer Implementation Associate; Charles Boody, Systems Analyst and Programmer; and Lee Rodel, Data Processing/Dissemination Specialist.

The technology and evaluation personnel bring to this unit expertise in a number of specialized areas that enables them to critically examine if a technology is appropriate for a school setting. Don Sension is an educational psychologist with a variety of teaching and evaluation experiences. Three members of the staff have taught in the Hopkins schools. John Erickson has been a high school teacher and currently is a district coordinator in math. Ken Corens taught at one time in the elementary schools and has privately consulted on instructional uses of the computer. Pam Askeland has taught home economics at the junior and senior high levels and is skilled in assisting teachers in seeing how technology can help them. Lee Rodel provides the staff with technical expertise gleaned from his experiences with Univac. Charles Boody brings to the staff the unique combination of system analyst, programming and music skills.

B. FINANCIAL SUPPORT

In addition to the technology demonstration funds, program activities are being supported through district funds and through income from software sales. The district has also received a Technology Lighthouse grant. These funds will be used to supplement technology demonstration funds when a workshop serves each project.

IV. PROGRAM IMPLEMENTATION

OBJECTIVE 1

Concern exists both nationally and locally about declining student standardized achievement test scores. Careful and extensive evaluation is needed to monitor student's academic progress resulting in considerable record keeping tasks for teachers. Information gathered from such evaluation and testing is most effective when available quickly to teachers, students, and parents.

The Hopkins School District has developed a computerized test scoring and record keeping management system, the Mastery Management System (MMS). As part of its technology grant, Hopkins proposed to expand the use of mastery management in the Hopkins schools with full implementation in the elementary reading program and expansion to other subject matter areas. In addition, Hopkins planned to share their experiences and results from using a microcomputer based instructional management system with other school districts.

The need for a computer management system became apparent after the district purchased the 1981 version of the Houghton-Mifflin reading series. This particular version required teachers to do extensive record keeping. Bob Muller, Curriculum & Instruction Coordinator in Reading, was approached by one elementary principal and a reading resource committee member regarding the use of a computerized system to score the reading tests. Since the computer management system had recently been modified to permit such test scoring in each building, Bob Muller was motivated to consider this proposal to gain a time advantage in receiving test results. Prior to that time, tests had to be sent out for processing and results were not available for three to five days. The coordinator brought the matter to the reading committee. It was decided to pilot test the system after the coordinator proposed ways the Mastery Management System could be adopted to the Houghton-Mifflin reading series.

The implementation of the system into the classroom evolved rapidly. The program was pilot tested in the fall of 1983 and by December the appropriate committees and boards were committed to its implementation in the elementary schools. This was accomplished by April of 1984.

The implementation was rapid and trouble free and many attribute this to the reading coordinator's implementation plan. The system was modified for the reading program; the reading program was not revised to fit the system. The system was pilot tested in one school and reactions of teachers, parents, aides, and students were closely monitored. Based upon the pilot data, the implementation was staggered in the schools so there would be ample time to adequately address issues and questions. The coordinator also involved key decision makers at appropriate times. The implementation plan also included a competency based in-service for the reading committee teachers. These certified individuals were then responsible for providing the in-service in their particular building. The coordinator believes this was important for a number of reasons, but most importantly it meant that each building had at least one person knowledgeable about the program. Another critical success factor, according to project staff, was the allocation of resources for aides in each building who would process the reading tests. This enabled teachers to receive testing information quickly. Another approach that was helpful to implementation was the presentation of the system as a teaching tool that would not require teachers to modify their teaching techniques.

Another portion of the implementation plan was communication with parents. The reading coordinator developed two guides for parents.

To assess teachers' reactions to the program, an evaluation was conducted last spring. The results are presented in Table 1. In a comparison between early and late implementers (Table 2), it was discovered that teachers who were among the first to implement the system held more positive attitudes about the system. Administrators cited two possible explanations for these results. The first implementers may have been more positive because they were initially most positive about the system. Alternatively, the last schools were still in the process of implementing the system at the time of the evaluation and may have still been dealing with the implementation problems encountered by all schools. This may have colored responses. The reading coordinator has noticed that the reading committee members haven't come to this year's meetings with negative feedback on the system. It may be too early to determine if the program helps students learn to read better. The reading coordinator and evaluation coordinator are continuing to examine the success and outcomes of the program.

TABLE 1

Grades 1-6 and SLBP Teachers
Number of Responses: 106

MASTERY MANAGEMENT AND READING SURVEY
April 1984

1.	Has the use of Mastery Management. . .			
	facilitated "diagnostic teaching" and retesting?	77.4% Yes	15.1% No	7.5% NR
	increased your effectiveness in communicating testing results to students and parents?	73.6% Yes	18.9% No	7.5% NR
	helped kids learn to read better?	29.2% Yes	42.5% No	28.3% NR
	Comments:			
2.	Did the in-service help you to understand the system?	99.1% Yes	0.9% No	
	Comments:			
3.	Should we continue to use the system?	80.2% Yes	1.9% No	17.9% NR
	Comments:			
4.	Should the Mastery Management System be expanded to other areas?	55.7% Yes	17.9% No	26.4% NR
	Comments:			

TABLE 2

Survey Data for Earlier and Later Implementing Schools

Items Showing Significant Differences

	Earlier Implementations (3 Buildings) # of Responses = 53			Later Implementations (3 Buildings) # of Responses = 53		
Has the use of Mastery Management...						
facilitated diagnostic teaching and retesting?	96.2% Y			58.5% Y		
increased your effectiveness in communicating testing results to students and parents?	88.7% Y			58.5% Y		
helped kids learn to read better?	45.3% Y	34.0% N	20.8% NR	13.2% Y	50.9% N	35.8% NR
should we continue to use the system?	94.3% Y			66.0% Y		
should the Mastery Management System be expanded to other areas?	75.5% Y			35.8% Y		

There have been positive reactions to and benefits from implementation of the reading management system. Administrators and school board members praise it. They see it as expanding teaching into diagnosis and prescription. The reading coordinator believes parents now perceive teachers as more knowledgeable because of the amount of specific information provided on each child.

In addition, the reading committee has been using the individual item data generated for the entire district last spring to identify objectives with less than 80% mastery. They have begun to develop materials for teachers to address these objectives. In some cases they found faulty test items and have communicated this information to Houghton-Mifflin. Another outcome of the project has been the development of a scoring card to help students mark their responses accurately. Demonstration funds were used to redesign these cards, to modify parents' brochures, for development of an operational guide, and to bind revised Houghton-Mifflin books.

Plans call for implementation of the management system into other curriculum areas. Discussions are underway within the elementary subject matter committees regarding adapting the management system. The science, and possibly the social science, committees may test a system in January. The evaluation coordinator didn't anticipate this occurring until next spring. He partially attributes these recent developments to the successful implementation of the system into the reading curriculum.

Staff members have conducted awareness sessions and workshops on the use of microcomputer-based instruction management systems for interested Minnesota districts. Two workshops have been conducted and four more are planned.

The workshops generally focus on overview and applications on the first day. During the second day, participants have an opportunity to visit sites, examine specific applications, such as the Houghton-Mifflin adaptation, and consult with staff. School districts can purchase the Mastery Management or CAM System, or the Mastery materials for the Houghton-Mifflin '81 Reading Series. Eight Minnesota school districts are presently implementing the MMS/Houghton-Mifflin Reading system. Ten districts are implementing MMS or CAM in other curricular areas.

Evaluations from the September 24-25 workshop were made available to the evaluator. Representative comments from the eleven participants are listed below:

"Job well done."

"Presentations well planned, detailed and presented with much enthusiasm."

"MMS is a valuable tool and it is good of you to share so freely of your time and resources."

"Excellent software, very professional staff."

"I need hands-on experience."

"We came to specifically hear about Houghton-Mifflin implementation and did."

On one site visit, the evaluator visited with one of the districts using the MMS/Houghton-Mifflin disks. The staff was very excited about the system. An aide who initially had difficulty learning the system was now positive about its usefulness.

Regular monthly visitation opportunities are provided on the second Wednesday and fourth Friday of each month, although the staff has been willing to take visitors at other times.

A related in-service goal was to develop videos of the in-services most frequently requested. This is still in the developmental stages. There has been more discussion about developing a video to present an overview of the system identifying what it can provide. Another idea is to develop a video on issues to consider when implementing a management system.

OBJECTIVE 2

The focus of this objective is the integration of higher level thinking skills (HLTS) into the kindergarten through eighth grade mathematics program. The need for higher level thinking skills (HLTS) in math has been articulated in two national documents. "A Nation at Risk" reported that many 17-year-olds do not possess these skills. "An Agenda for Action" recommended that curriculum materials must encompass more than computation exercises, that they must also promote the development of problem solving skills.

The need for HLTS was also recognized locally. Last year the math curriculum committee reviewed the math curriculum. They found a lack of emphasis on HLTS, that the focus was primarily on adjunct enrichment activities, and that there was a need to evaluate HLTS software and courseware. Based upon these needs, plans were made to involve math curriculum specialists in locating, evaluating, cataloging, and applying computer software emphasizing HLTS. The plan also included developing curriculum projects and staff in-services.

A committee has been identified and charged with carrying out the project. This team includes the district math coordinator, two elementary teachers, a math teacher and the math department chair from the high school, the district challenge coordinator, and an individual working with the district's special education and cooperative group projects. They are recruiting a junior high school representative.

The committee has begun to examine articles on problem solving and higher level thinking skills to become aware of the current research in this area. In addition, they are in the process of inviting a resource person to help them refine their definition of thinking skills and to offer suggestions on ways to attain their goal. The committee has begun collecting software and identifying existing district resources and activities. An in-service course for the Hopkins staff is being developed. The goal will be to design a series of instructional modules for teaching higher level thinking skills. The course would invite knowledgeable resource people to address the HLTS issues and utilize existing literature to help participants develop the instructional modules. In addition, an elementary teacher on the committee has developed a problem solving project for her school. The project is designed to give teachers an opportunity to learn about and experiment with problem solving techniques.

The committee members reported that the demonstration funds have been the catalyst for the district's examination of this issue in depth. The funds provide release time for staff to explore what is available in this area and to develop materials for the district. One member stated that current software packages are being marketed as developing HLTS, yet often contain only drill and practice exercises. Demonstration funds will enable the district to examine software critically to determine if it will provide the experiences needed.

The committee has set a timetable but stress that it is subject to change. They are most concerned with providing quality products and not in meeting arbitrary timelines. Two factors have made the ending grant date potentially unrealistic for this activity. The first was the delay in funding for this district. This made it impossible to arrange for staff to work over the summer. Secondly, an administrator perceives the emphasis on working the project through the math committee as one factor that will slow down its progress. The administrator also sees a change in emphasis. Originally, the proposed activities focused on locating, evaluating, and implementing software that would promote the development of HLTS. The direction now appears to be one of developing a definition of higher order thinking skills and a model for teaching them. After this has been resolved, technology will be examined to determine its most appropriate use. These factors may slow down the process but it may be argued they will result in a more lasting and meaningful impact on developing higher level thinking skills.

OBJECTIVE 3

Completion of the third objective to expand the district's technology in-service program has been affected by delayed funding, although in recent weeks there has been a higher level of activity.

The primary goal of this activity is the widespread incorporation of technology into the classroom. The approach taken is to allow teachers to identify their own in-service needs. The demonstration funds are available to help individuals or groups develop their expertise by providing release time, time to prepare for substitute teachers, and/or developmental resources.

There are a number of phases to this activity. One is to provide media specialists from each building an opportunity to meet. This time is also being used to disseminate new software. In the past, staff were informed of software acquisitions through memos or meetings, but were required to provide their own disks for copying. This year, demonstration funds enable distribution of new software to all schools. At a media meeting, one specialist reported that the demonstration funds were helping them to do things they couldn't do in the past because the time was not available. One reported setting up her lab during the release time. Another used the time to in-service volunteer computer aides. Others said they were now able to review software that previously would have gone unused because there was no time to learn about these resources. During this meeting, media specialists also helped project staff become aware of teachers' perceptions of past in-services and identified ideas for future workshops. This information sharing was one of the outcomes the project staff had hoped would evolve from these meetings. Staff wanted to develop a communication network where media specialists would listen for individual teacher and building in-service needs.

Originally, the project staff planned to disseminate software directly to the media specialist. The media staff recommended that the software first be distributed to the curriculum commitee for review. Curriculum committees now evaluate new software, and recommend means of implementing it into the curriculum. These evaluations, the software and documentation are then distributed. This process results in each building having two people to whom teachers can go for software information.

This past summer fourteen in-service courses were conducted: Intro To The Apple, Word Processing I, LOGO I, BASIC Programming I, Teacher Utilities, Data-Base Management, Printer & Peripherals, Software Evaluation, Integrated Systems (Appleworks), Authoring Programs, and Spreadsheet. There were repeat offerings of some courses. Thirty-four teachers and six secretaries/aides participated. The media specialists reported that teachers and staff found the summer workshops very useful. Some teachers have begun to use their skills and ideas in the classroom. One of the teachers the evaluator spoke to reported that the summer workshop provided her with new ideas on how to use limited technology resources. She mentioned that she was using the word processing skills from another summer class with her fifith and sixth grade students. She is having students use a word processing program to write creative stories that will eventually be made into a book. English teachers at West Junior High have also become interested in learning how a word processing program could be used in their classes and have arranged for help from the technology staff.

A number of activities have been made possible because of available release time for regular teachers. This summer eight teachers reviewed software and developed specific plans for their use in the classroom. The kindergarten and first grade materials have been printed and are being disseminated to other teachers at two workshops. The third and fourth grade LOGO materials are being used by the teacher who developed them and will be disseminated after final revision. The fourth and fifth grade materials are being revised.

Release time is also being requested by a number of other teachers and staff. One elementary principal has requested release days for his curriculum specialists and teachers to review software and develop plans for implementing it into the curriculum. Junior high teachers are planning to develop an in-service on science and the computer.

In most cases it is too early to determine the direct impact in-service activities have had on students. The project staff will be examining the extent to which new services have been provided to staff and parents, and determining if 75% of the in-service participants have applied learned concepts into their classrooms. The teacher programming portion will be judged successful if one instructional program is designed, created, and used for each quarter of the school year.

OBJECTIVE 4

Objective four resulted from funds made available when objective one goals were largely accomplished before funding was approved. This objective focuses on the development of innovative instructional delivery systems utilizing video and microwave technology. These systems are seen as having potential for giving students access to educational experiences previously unavailable to them.

One means project facilitators have selected for accomplishing this goal is using video to provide students with access to occurrences in nature. Programs designed to increase students' awareness of the delicate balances which exist in nature have recently been introduced to elementary and secondary science curricula. The problem has been providing all students with access to resource locations at the appropriate time. The Hopkins School District's science program includes a professional naturalist who is in residence at and offers school visits to Carver Park. Classes make one or two visits a year to the nature center, and the naturalist tries to visit each class five times a year. One of the problems that technology could resolve is that many natural events such as bird migration can be witnessed only by the students visiting at that time. The science staff's aim was to provide all students with access to these exciting events.

The elementary science committee, representing all elementary buildings, undertook this project. They plan to develop a number of video tapes on naturally occurring events for elementary classrooms. Eventually, they hope to use microwave to telecast live from the nature center.

The science committee is participating in an in-service designed by Dan Eckberg, Coordinator for KHOP-TV and Coordinator of High School Instructional Services. These science teachers have been certified to operate a video camera and are learning how to script, edit, shoot, and promote a video program. The committee decided each member would produce a video, but they would all help the first member produce a video on how leaves change color. The video is targeted for a primary school audience. The committee has been involved in reacting to the script, examining it for accuracy and appropriate vocabulary. Class members will receive in-service credits for filming and editing programs outside of contracted school hours.

Fifth graders have been and will be the camera crews for the videos. Each elementary school building has a crew and each will work with their building science committee member. Jim Gilbert, the school district's naturalist, and Hopkins elementary students are the actors. The first video is to be completed by December 1. A visitor can now see a portion of this program. It is impressive. Some of the filming and scripting have been completed for a second video on adaptation. The committee is in the process of identifying topics for other programs.

The most obvious outcome from this project will be the production of video tapes on naturally occurring events. But there are other outcomes. Committee members are acquiring skills made possible by existance of this project. They are enthusiastic and excited about it. The in-service director is pleased with the in-service model evolving from this experience. Undoubtedly there is positive impact as well on the student participants.

This project was also delayed by the funding process. As a result, the first time the science committee could be contacted as a group about this activity was the first of September. The committee has completed all mentioned above in only two months. One administrator attributes the success of this project, thus far, to the fact that the science committee has a sense of ownership. Another attributes it to a very professional staff, busy, yet willing to undertake new tasks.

SUMMARY

The project staff for the Technology Education Center - Hopkins (TECH) are using state funds as proposed and are making great strides in accomplishing stated goals. The implementation of the Mastery Management System into the elementary reading curriculum has been accomplished, and the district's reading coordinator and evaluator are examining methods to evaluate its effectiveness. Other subject area committees are also examining how MMS can be used in their programs. The TECH staff have hosted and provided in-service for approximately 374 individuals from many Minnesota school districts. The math curriculum committee is examining how higher level thinking skills can be integrated into the curriculum, and staff in-services are being planned. The in-service activity has resulted in a number of teachers and media specialists examining how technology can be used in the classroom. In addition, the elementary science committee is using video to provide elementary students with access to nature's wonders through the Carver Nature Center video project.

A number of factors appear to have a strong influence on the ability of the Hopkins district to accomplish promised goals. One is the commitment to having needs identified from the grassroots through curriculum committees. This may result in an outsider viewing project activities as disjointed, but it appears to promote goal accomplishment as the project facilitators, those very committees, get excited about working on resolving identified issues.

Another factor is the district's commitment to innovation and the use of in-service and mini grants to help teachers explore creative ideas. Their in-service program has been in existence for at least 15 years and offers teachers pay or credit that can be used on salary schedules.

Another factor seems to be the view the technology should be a tool to promote effective teaching. This perspective translates into finding ways technology can help teachers. The superintendent's comment seemed particularly insightful and echoed others' views. He said, "I really firmly believe technology exists to improve instruction, and the development of technological application should be in the context of improving instruction. Otherwise, all we are looking for is a fancier tape recorder, or overhead projector and ten years from now that is all we will have accomplished."

Another strength of this project is the TECH staff who have a combination of evaluation, technology, and teaching expertise. As the superintendent said this concentration of individuals devoting their time to technology in the school system helps the district understand potential uses of technology, identifies pragmatic applications, and has credibility with teachers.

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INTECH
TECHNOLOGY DEMONSTRATION SITE
CASE STUDY

I. INTRODUCTION

Schools are challenged to provide students with adequate backgrounds to function in what is increasingly becoming a highly technological society. Most occupational choices are being affected by the impact of technology on the world of work and leisure. In order for schools to meet this challenge, it is imperative that the instructional staff of the schools develop the skills, knowledge, and understandings about society and technology that will allow them to design and implement educational programs that will assist their students to utilize and understand technology.

II. PROGRAM CONTEXT

The INTECH Technology Demonstration Site program is the direct result of the requirements of the legislation that established the technology demonstration sites. Eight northern Minneapolis suburban districts, the Anoka-Ramsey Community College, and the Anoka Area Vocational Technical Institute joined an effort to cooperatively serve as a Technology Demonstration Site. The districts elected not to become a joint powers unit but rather to proceed on a strictly cooperative basis. The project is guided in its efforts by a steering committee made up of representatives from the cooperating school districts.

Each district, for a variety of reasons, has staff who have been involved with technology in education and have developed application for use in their teaching. The districts and some staff members have been involved with MECC and/or TIES. As the widespread utilization of technology has become more desirable/feasible, the districts have sought ways of conducting district-wide staff development in technological applications.

A major thrust of the Technology Demonstration Site program is to assist with the widespread adoption of technology in the cooperating districts. The INTECH project in many respects is a developmental effort, focusing on creating an inservice system based on the skills of the personnel who for whatever reasons have developed and are willing to demonstrate educational applications of technology. The design and organization of the system of developer/demonstrators and the manner through which they become involved with the inservice needs of local districts has been established.

The project involves the following school districts, all located in the northern Minneapolis suburbs.

District	ISD	Student Population
Anoka-Hennepin	#11	30,695
Centennial	#12	2,956
Columbia Heights	#13	3,924
Fridley	#14	3,068
St. Francis	#15	3,970
Spring Lake Park	#16	4,060
Brooklyn Center	#286	1,319
Elk River	#728	5,119

III. PROGRAM RESOURCES

Anoka-Hennepin District #11 is serving as the fiscal agent for this program. The Anoka-Hennepin and Fridley districts are supplying director services, four classrooms, two offices, furniture, secretarial support, and duplicating services to the project. The six other districts are contributing $1.00 per student enrollment to the project in addition to some equipment for the labs. As a member of the INTECH Project, the Anoka-Hennepin district has been named by IBM as the recipient of a large grant of 75 IBM microcomputers, software, and training in support of computer education in the schools. The "IBM" lab at Blaine High School is dedicated to staff inservice training and is considered a part of the INTECH project.

The INTECH project is based on a cadre of teachers from the cooperating districts who for a variety of reasons have become involved with technology in their teaching and have developed a set of skills, methods and understandings about incorporating technology into the curriculum. These persons are called developer/demonstrators. The developer/demonstrator staff will conduct training activities with key personnel from each school district to pass along their expertise. In many cases this training will occur through the utilization of various forms of technology such as video tapes or computer software. The building contact persons will serve as turnkey trainers and will assist their co-workers through the use of the materials and procedures that have been provided to them.

The INTECH project has established two computer labs to support the inservice activities. One is located in Blaine High School and the other in the Fridley Middle School. In addition a bus has been converted into a Mobile Technology Laboratory. The mobile laboratory travels to the cooperating school sites in support of inservice efforts. Included in the mobile lab are a number of different microcomputers, related software collections, an interactive computer-laser video disk demonstration unit, and a high quality color video tape recorder/player unit, and library of demonstration tapes featuring applications of technology in educational processes.

A. IMPLEMENTATION

The project is governed by a steering committee made up of members appointed by the superintendent of each cooperating school district. It is intended that each participating district will share equally in decision-making through group concensus. In no case is a superintendent directly involved in project operations. A project coordinator has been employed to carry through the day-to-day operations of the project following the directions of the steering committee.

The steering committee designed and conducted a needs assessment of the member districts to determine the priority areas for inservice training in technology. Each district was asked to rate the priority of needs in the district at the primary, intermediate, junior high, senior high, and post secondary grade levels in 22 subject matter areas. The subject matter areas considered were: Art, Business, Computer Science, Foreign Language, Guidance/Counseling, Health/Physical Education, Home Economics, Industrial Arts, Language Arts, Literature, Mathematics, Music, Science, Social Studies, Special Education, Speech, Teacher Utilities, Vocational, Word Processing, Problem Solving, Robotics, and Media/Video. The districts were also asked to identify staff members having expertise in the areas being rated in the needs assessment. The result was the districts perceived that

needs existed in all the areas except for vocational topics. On the basis of the needs assessment 35 areas were identified. Nineteen of the 35 developer/demonstrators are working in more than one topic area.

Subject Area	Number of Developer/Demonstrators
Business	8
Computer Science	14
Elementary Areas	4
Foreign Language	1
Guidance/Counseling	1
Health/Physical Education	1
Problem Solving	2
Home Economics	1
Industrial Arts/Vocational	2
Keyboarding	1
Language Arts	3
Mathematics	5
Media/Video	2
Music	1
Robotics	1
Science	5
Social Studies	4
Special Education/Speech	2
Teacher Utilities/Administration	6
Word Processing	4

A catalog of developer/demonstrators has been developed and distributed. The plan is for key personnel in each school to be trained by the developer/demonstrators and then to serve as turnkey trainers in the local setting. Support materials maintained by the project are available to all trainers. Local training may occur utilizing the mobile lab, or at school buildings utilizing school resources, or at either of the labs maintained by the project. The project office serves as a clearinghouse between developer/demonstrators and the school personnel. The school site personnel may contact the developer/demonstrators directly if they wish. Each training session is announced to the other schools so that they may join in the sessions.

The INTECH Mobile Laboratory is filling a special need in the various inservice efforts. So far it has been utilized primarily to develop awareness about high technology and its many forms and applications in the educational setting. Schools or organizations requesting that the mobile lab be brought to their site are required to specify an agenda of activities and objectives. Future plans for the mobile lab call for the lab to be utilized as a site to conduct training sessions at schools, industries, or at other interested organizations that interact with the INTECH program.

The developer/demonstrators are meeting monthly for two important reasons. One is to develop strategies for working in the developer/demonstrator role and to share insights gained from those experiences. The second purpose is for the developer/demonstrators to continue to grow in their own use of technology. At each meeting the project tries to provide some form of inservice development to the group. The developer/demonstrators are also active in reviewing software and reporting the findings to the project. In time these reviews will become the basis for project wide inservice topics.

Initial steps to involve area industries with the INTECH program have begun. Through the community education directors and Metro North, a questionnaire is being sent to area firms to survey the interest of these organizations in cooperative efforts for training about technology. The industry-school link with IBM is well established.

IV. PROGRAM OUTCOMES

The INTECH project has identified 35 developer/demonstrators from among the INTECH member organizations. They were selected because of their interest and expertise in an area identified as a priority need within the INTECH project districts. A listing of the developer/demonstrators and their topic areas has been disseminated to key personnel in the project districts. The developer/demonstrators meet monthly to discuss needs and issues and to continue their own inservice growth.

At this time two training sessions involving developer/demonstrators and key school personnel have been scheduled. It is expected that with the school year now underway many additional sessions will be scheduled involving interdistrict contact. Interviews reveal that considerable intradistrict inservice is occurring and frequently involves the same key personnel that are participating in the INTECH project.

The developer/demonstrators are also being requested by the project to develop video tapes that illustrate some of their methods, as aids in the training programs. Techniques and facilities for making training video tapes have been identified. For example, a newscast approach seems to be easier than demonstration teaching. Eleven tapes have been produced on a developmental basis. Tapes will continue to be made on a time available basis. At a recent meeting of the developer/demonstrators, the prevailing thought was that extensive production of training video tapes should be delayed until summer 1985. As the tape library grows it is expected that the training tapes will increase in importance in the overall inservice function.

The INTECH mobile lab has been utilized extensively during the fall. Through November it has been on site 19 days at INTECH schools and 22 days on site throughout the State serving other requests. Interviews with persons participating in the mobile lab suggest that it is effective in increasing their awareness of available equipment and software. Minor modifications of the vehicle continue to improve its utility.

The IBM laboratory located at Blaine High School is on-line. A cadre of personnel have been trained with the equipment and software. Basically Anoka-Hennepin District #11 personnel are initially involved at the site. The Centennial district also has IBM equipment and has been involved at the Blaine lab. After an extensive delay in the delivery of equipment, the Fridley lab is now operational. Groups are now being scheduled into that site.

Initial steps to involve area industries with the INTECH project have begun. A questionnaire is being sent to area firms to survey the interest of these organizations in cooperative efforts for training about technology. The industry-school link with IBM is well established and resulted in the Blaine IBM lab and training for selected personnel.

It is clear to key project personnel that the INTECH program is complex enough that additional staff is needed to maintain the mobile lab schedule, to facilitate the inservice programs, to create the video tape training materials library, and to develop relationships with area industries.

V. SUMMARY

The INTECH project is a start-up, developmental project. The INTECH project has initiated a set of activities designed to encourage educational uses of technology by more of the personnel in the eight cooperating districts. The mobile lab has been effective in demonstrating technological equipment and software to personnel at their school sites. The project has also established two technology labs having sufficient equipment and software for inservice. One lab is the result of a grant of equipment, software, and training from IBM corporation. Based on a needs survey, 35 developer/demonstrators have been identified who have expertise in the use of technology in the priority needs areas identified by the districts. The developer/demonstrator's role is to train key personnel in requesting districts who then are to serve as turnkey trainers in their buildings. The developer/demonstrators also are requested to make demonstration video tapes of technological applications for use in the inservice program. Initial steps to link INTECH with the technological training need of area industries are underway.

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01/04/85

THE KNOWLEDGE INTERACTIVE DISTRIBUTION SYSTEM (KIDS) CASE STUDY

I. INTRODUCTION

The Knowledge Interactive Distribution System (KIDS) was originally designed to link fifteen school districts, Mankato State University, the University of Minnesota-Waseca, The South Central Educational Cooperative Service Unit, the ESV Region 5 Computer Services Unit, the Mankato Area Vocational Technical Institute, and the Regional Inter-Library Cooperative System (SMILE) through a multi-channel two-way interactive television system. The goal is to provide expanded curricula, inservice programs, and educational offerings for schools and communities in southern Minnesota.

The school districts involved in the project are Amboy-Good Thunder District 079, Cleveland District 391, Garden City District 078, Janesville District 830, Lake Crystal District 070, Le Center District 392, Madelia District 837, Mankato District 077, Mapleton District 072, New Ulm District 088, Nicollet District 507, St. Clair District 075, St. Peter District 508, Waldorf-Pemberton District 913, and Waseca District 829.

II. PROJECT CONTEXT

A. DISTRICT DESCRIPTIONS

The largest school district in the consortium is Mankato, which serves approximately 3,000 students in eight elementary schools, 1,000 students in two junior high schools and 2,000 students in two senior high schools. The smallest, Amboy-Good Thunder, enrolled 160 elementary students and 186 secondary students in 1983. In the original proposal, it was projected that more than 45,000 students could benefit from full implementation of the KIDS project.

These districts and institutions have been involved in past cooperative educational activities, although not as a combined group of 15. Over ten years ago, the northern cluster of St. Peter, Nicollet, Le Center, and Cleveland joined together to form a special education cooperative. They also built a cooperative service center on the outskirts of St. Peter. In the southern cluster, a number of school districts have been working together to provide their students these special educational opportunities: St. Clair/Janesville, Physics; St. Clair/Waldorf-Pemberton, Preschool Speech, Building Trades; St. Clair/Mankato, Special Education; Amboy-Good Thunder/St. Clair/Mankato/Mapleton, Multihandicapped; Amboy-Good Thunder/Mapleton, Elementary Principal, Vocational Agriculture, Science; St. Clair/Waldorf-Pemberton/Ellendale, Special Education; and Mankato Area High Potential Gifted.

The KIDS project is intended to remedy the problems many small school districts face in providing elective courses and in-service programs. Recently, many states concerned about educational opportunities for rural students, have begun to mandate that all school children have an equal opportunity for exposure to specific courses. The schools involved in this project, however, are finding it difficult to provide the breadth of the curriculum required. This is due to eroding revenue bases resulting from declining enrollments and the economic problems of this predominently agricultural area. Also, the rural population is aging and appears more reluctant to support school-associated bonds or levies.

Smaller school districts are presently transporting students to provide them with elective courses. In some situations, the equivalent of one class period is spent en route, a matter of legitimate concern. Concerned superintendents view the KIDS project as a way to eliminate travel time and costs. They also view KIDS as a potential alternative to consolidation with larger school districts.

Both large and small school districts believe the KIDS project will also provide greater opportunities for gifted and special education students. The interactive system is also seen as providing students access to university courses and library resources.

C. GOALS/ANTICIPATED OUTCOMES

Major objectives as provided in the original proposal are as follows:

1. To provide expanded and enhanced educational opportunities to rural schools and communities and to increase cooperation among all schools in this geographic area.
2. To provide inservice for staff in the effective use of high technology as an integral part of staff renewal and curriculum development.
3. To promote expanded community use of the educational systems by providing a variety of course offerings in the area of secondary, post-secondary, vocational, and general interest.
4. To involve business and industry as an integral part of the project. This involvement will not only be advisory in nature, but will offer support in areas of expertise and experience with technology. The model site will provide a unique opportunity for business to cooperate with public schools and institutions in defining its emerging role in education.
5. To demonstrate the integration of state of the art technologies that have the capabilities to interactively connect (1) libraries (information and media dissemination); (2) Mankato State University; (3) Mankato Area Vocational Technical Institute; (4) University of Minnesota-Waseca; (5) public schools; (6) Educational Cooperatives (South Central ECSU and ESV Region 5); and (7) community households.

III. PROGRAM RESOURCES

A. GOVERNANCE/STAFFING

The KIDS consortium is governed by a Joint Powers Board comprised of one school board member from each participating district. The board acts on behalf of member districts in applying for, receiving, and administering funding, including state and federal reimbursements. Its responsibilities are:

1. To provide for a thorough and continuing system of reporting to and communicating with the school board of each member district.
2. To employ a program director...
3. To authorize all contracts on behalf of the Knowledge Interactive Distribution System...
4. To employ personnel as recommended by the director.
5. To adopt by-laws to govern the operation of the Knowledge Interactive Distribution System program.

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6. To establish a sound financial program and an appropriate system of record keeping separate from any member district.
7. To conduct regular monthly meetings.

An Executive Council serves in an advisory capacity to the Joint Powers Board. The council's membership consists of the Project Director, the superintendent of each member district, and one appointed representative each from Mankato State University, the University of Minnesota- Waseca, the Mankato Area Vocational Technical Institute, the Educational Cooperative Service Unit/South Central Minnesota, ESV Region 5 Computer Services, and the South-Central Minnesota Inter-Library Exchange. Their decisions are subject to the review and approval of the Joint Powers Board.

Dr. Frank Birmingham serves as Project Director. He has expertise in the areas of telecommunications and cable and has studied the effects of TV on children and adolescents.

As Professor and Chair of the Library Media Education program at Mankato University, he consulted with project developers in the development of the technology demonstration proposal. In April, Dr. Duane Orr, Dean of the College of Education, assigned Dr. Birmingham to work full-time with the KIDS project during spring quarter. Employment continued during the summer under a replacement cost agreement. The Joint Powers Board contracted for 12.5 additional days between August 1 and September 6. In addition, he worked full-time on the KIDS project during fall quarter, again with a cost replacement arrangement. The Project Director is directly responsible to the Joint Powers Board and the Advisory Council.

The agreement for Knowledge Interactive Distribution System specifies that the project will be financed in the following ways:

1. By applying for and receiving State and Federal aids and reimbursements for which the system may be eligible.
2. By equal contributions on the part of each of the fifteen participating school districts for the construction of the main system and the continued operation of the main system.
3. By each individual district funding the equipment needed to connect the system at the district site.
4. By user fees established by the Knowledge Interactive Distribution System project but paid by the receiving school to the school delivering services.
5. By further payments from member districts as deemed appropriate by the Governing Board.

Because the final cost of the system was/is uncertain, the Joint Powers agreement made provision for withdrawal. If a district would decide against participation, it would be obligated to pay its share of expenses to that point, including the cost of engineering consultations, a project director, and other activities.

Each district provided $5,000 for design studies and bidding costs. They all agreed that the state funds should be refunded if costs prohibited the KIDS project from becoming operative. Each also agreed to commit $35,000 for construction.

Contributions from the participating agencies and universities are largely in-kind. Mankato State University provided the director's spring salary and benefits, part of his summer salary and benefits, assistance of their grants officer in seeking additional funding, writing and editorial support, computer time and supplies, a WATS line, a site for the microwave antenna and transmitter building, printing, and clerical support.

The Mankato School District has made substantial in-kind contributions including office space, telephones, and secretarial assistance. The Mankato School District has been the designated fiscal agent and R.J. Rehwaldt served as supervising superintendent.

IV. PROGRAM IMPLEMENTATION

KIDS is classified as a start-up project. The feasibility of its interactive system had yet to be explored at the time of funding. Over the past months the Project Director and participants have been working with the Minneapolis based consulting engineering firm of Michaud, Cooley, Hallberg, Erickson, and Associates, Inc.

First meetings were designed to acquaint the superintendents and board members with the range of available technologies. Program staff and advisory council members, with the assistance of engineering consultants, reviewed a variety of system options and scheduled several visits to operating interactive television programs.

The engineering study resulted in a recommendation and bid specifications for a system which would utilize an interactive 12 GHz duplex microwave system, with hubs (transmission points) at St. Peter and Mankato. This system would provide for instantaneous communication among sites and would assure that students and teachers would see and hear one another at all times. The engineering study and the bid specifications were formally presented to the Joint Powers Board on August 1, 1984. Construction bids were to be received on October 3.

During the interim, a number of activities were undertaken to educate school boards, school personnel, citizens, government officials, and businesses about the proposed system. The Project Director and engineering consultant attended a number of meetings. Mankato State University produced a video on KIDS. This presentation could be requested from Mankato State University for informational programs. Each participating superintendent was given a copy of the video on KIDS.

On September 5, the Joint Powers Board invited all school boards to examine and discuss major areas needing to be addressed once the system was developed. Board members divided into small groups and discussed seven major areas with summary reports being presented to the entire assembly. Topics discussed were the school calendar; starting times in each cluster; course offerings; scheduling within the project--who receives what and when, who has priority for a class; implications for teacher contracts, compensation, and assignments; and tuition paid by a student's home district to the district providing the instruction. Prior to the September 5 meeting, the northern cluster superintendents met separately and discussed these issues.

The Joint Powers Board approved a $360 per class tuition rate (x $180 per half-year) for the 1984-85 academic year. A policy guaranteeing 5% minimum student participation based on the average daily attendance in grades 9-12 as of October 1, 1984, was adopted. Districts would pay $360.00 for each student over the 5% minimum utilizing the system. These policies were to be reviewed annually.

According to the Project Director, these tuition rates were established with input from the St. Peter and Mankato superintendents projecting recovery of costs over a five to ten year period. Mankato anticipated the need to hire teachers to meet class demands in addition to paying for the system equipment. It was believed these larger school district's boards would not allocate resources to building the system unless they could recover these costs.

The Project Director has also been pursuing alternative sources of funding. In August, a grant proposal was submitted to the United States Office of Education Secretary's Discretionary Fund. The proposal requested $97,000 to cover half of the director's salary, half of the salary for a university-business-community liaison, and the entire cost of a two-week faculty inservice workshop. There has been no reply from the Office of Education.

Letters of inquiry were also sent to the Bush, McKnight, and Northwest Area Foundations. The foundations have expressed interest in supporting program activities when the system is operative but will not provide funds for equipment.

On October 1, bids were opened from Northwestern Bell, Todd Communications, and Information and Communications Services. The October 10 board minutes summarize the bids as follows:

1. Northwestern Bell:

   The bid was for a lease-only system with two payment options. It did not include some of the information requested or include detail about the equipment proposed. Michaud, Cooley, Erickson and Associates feels the bid did not meet the specs and should not be considered.

2. Todd Communications:

   Bid received was for a ITFS system forward. Michaud, Cooley, Erickson and Associates feels this bid does not meet specs and should not be considered.

3. Information and Communications Services:

   The bid received was for $1,726,000 or $109,169 per district. The average additional cost of a tower with shelter in this bid was $42,400. The average cost to a district would be $151,569. The bid contains a three or five year financing plan. Michaud, Cooley, Erickson and Associates feels this bid meets the specs and may be considered.

A detailed discussion of the bid, the cost, and the status of the state demonstration grant followed. In polling the group, a representative of only one school district indicated his school board might approve the bid. The board also discussed the Joint Powers Agreement and whether schools could continue in the project if the bid was rejected. It was decided to ask school boards to consider two issues: first, the bid received and secondly, whether the district wanted to continue participating in KIDS.

Between October 10 and October 24, the Project Director and engineering consultant examined options open to the KIDS project. The northern cluster of St. Peter, Nicollet, Cleveland and Le Center also examined alternatives. At the October 24 Advisory Council and Joint Powers Board meetings, it was decided to phase in the KIDS project by constructing just the Northern cluster. This came in the wake of an almost unanimous rejection of the original plan because of high construction costs. The Joint Powers Board agreed to let the northern cluster use the state grant to hook up St. Peter with Mankato State University if the State Board of Education agreed. This decision was made becuase the northern cluster was best prepared to implement a smaller version. It was agreed that the northern cluster would pay for their own engineering fees and that if a second year grant was awarded to KIDS, it would be used to help set up the southern cluster links.

The Waldorf-Pemberton and Janesville School Districts decided not to continue in the KIDS project. Their superintendents said they had found participating in the KIDS project very worthwhile. They felt they learned from meeting with the area superintendents and gained new understanding of the technology available to solve educational problems. The cost, however, was prohibitive. Janesville had to make a decision on a cooperative levy by October 10 and because the bid was too high, decided not to certify a tax levy. Waldorf-Pemberton decided they couldn't justify committing 1984-1985 funds for students who would be only served at a much later time.

On November 8, the Governor's Advisory Committee on Technology in Education approved the redesigned project. On November 14, the Minnesota State Board of Education unanimously approved the redesigned KIDS project. They did, however, restrict the state money to use for the St. Peter/ Mankato State University/Mankato AVTI link. On November 19, specifications were mailed from Michaud, Cooley, Erickson, and Associates to those companies who requested documents on the original proposal. The bids will be opened on December 5. That same afternoon and evening, the Advisory Council and Joint Powers Board will meet. Ed Lethert will make a recommendation to the northern cluster Joint Powers Board members and superintendents on December 10. The bids will be accepted or rejected by December 19.

The new configuration now out on bid is a microwave system at 23 GHz. This higher frequency system is much less expensive than the one originally specified. This 23 GHz system is appropriate for a range of 13 miles. Previously, it was understood that it could be used only for a 5 mile range. The base system out for bids includes a duplex from St. Peter to Nicollet, a duplex from St. Peter to Cleveland, a duplex from St. Peter to Le Center, a duplex from St. Peter to Mankato State University, and a duplex from Mankato State University to the Mankato Area Vocational Technical Institute. Options include additions of one or two channels to Nicollet, one channel to Le Center and Cleveland, and a second duplex to Mankato State University. The engineering consultant expects costs of approximately $30,000 between any two points. Schools are still required to set up their own classroom at an anticipated cost of $10,000.

With the move to the northern cluster, the fiscal agent has become the St. Peter School District.

In discussions with the four northern cluster superintendents it was learned they are still in the process of resolving tuition costs and how system costs will be divided. They stated, however, that they have been through these resource issues before with the creation of their cooperative vocational technical center and are sure they will come to a solution. Presently, the plan calls for each district to absorb its own costs. The tuition cost set at a previous Joint Powers Board Meeting was $360 per student per year. The Project Director thinks this may be revised downward because it was originally based upon Mankato and St. Peter recovering their costs over a five to ten-year period. He stated it may not be as costly for St. Peter alone.

The principals in the northern cluster have been kept informed throughout the project. According to superintendents, reactions from teachers are mixed. The St. Peter superintendent who sent the two teachers most likely to teach on the system to Braham stated that all his teachers were generally positive about the system but also recognize there is a degree of risk involved.

Nicollet teachers and some at Cleveland appear to see the system as a way to save their schools from consolidation, thereby saving their jobs. Some are more negative and concerned that the system will replace teachers and uncertain the system is the best way to teach students. The general approach throughout the project has been to regard these issues as something to be dealt with once there is certainty there will be a system.

SUMMARY

Thirteen of the original fifteen school districts have decided to remain in the KIDS project and look at alternative technologies for accomplishing project goals. As a group, they decided to allow the four school districts making up the northern cluster to use the state grant funds to set up a pilot project. The State Board of Education agreed to this new configuration but stipulated that the grant be used to link the northern cluster hub of St. Peter to Mankato State and Mankato's Area Vocational Technical Institute. Bids have been requested and will be opened December 5 with a decision to accept or reject the bid to be made by December 19.

The 12 superintendents the evaluator interviewed felt their involvement in the KIDS project has been very beneficial. They report having a better understanding of regional educational issues and a newly formed working relationship with area districts. They also feel that they have increased their understanding of technology.

Another outcome is a complete record of Joint Powers Board minutes, memos, and newspaper articles on the project. This documentation would be useful to others interested in a similar undertaking.

The superintendents identified two critical factors that prohibited the project from being implemented as first envisioned. The first was cost. Originally, they were informed that the cost would be about $30,000 per district. This figure grew to $70-$90,000 and finally to $160,000 per district. Superintendents also said their original understanding was that the cooperative levy could be used by both large and small school districts for this project. Larger districts were, however, informed the levy could not be used in the KIDS project. Many superintendents feel that the state doesn't provide incentives for larger districts to cooperate with smaller districts on ventures such as this.

Other factors which slowed down the process were that the 15 districts had never operated as a group previous to this project. There was also little understanding among the district superintendents or Joint Powers Board members about interactive technology and little knowledge about the cost of a system this large. Others reported that the size of the group may have limited its success because as the system grew, so did the cost. Yet it is important to note the proposal writers were advised by state staff their project was not unique if only a small number of districts participated.

The region is also disadvantaged because there are so many different cable, telephone, and power companies operating in these school districts. As a result, there is no one large company interested in helping finance this system as has been the case with other interactive projects in the state. Also, foundations were interested in assisting the project only after the construction was complete.

It is interesting to note, that the districts were committed to using state funds for equipment purchase not consulting or meeting expenses. They decided early in the project that if the costs of installation were prohibitive, state funds would be returned intact.

It is too soon to predict the long term effect of the project. The communication network could have a major impact on the region. There is a strong commitment to the ideals of KIDS. For some small districts it seems to be a matter of survival and districts are committed to looking at alternatives even if the state withdrew funds. The project has worthwhile goals, but to succeed, both time and major financial resources are necessary.

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I. INTRODUCTION

The Minneapolis Public Schools' Technology Demonstration Site is a way for the district to give visibility to a large number of existing applications of technology. It is also a way to improve and promote five magnet programs at North and Edison High Schools, all of which heavily emphasize and use technology.

The program has two basic components, one of which is relatively complete and readily demonstrable; the other somewhat more difficult to demonstrate easily. The first is a demonstration of a number of very sophisticated examples of technology at work in this large urban school district. The second, somewhat less visible, is a process of curriculum development, staff training, inservice and communication, and other activities designed to improve programs and encourage communication among staff and coordination between programs. This is not a "new" program; much of what can be seen by a visitor to the sites has been in place for some time. It is, however, a new effort to enhance those uses of technology and speed up what staff believe is a necessary process of improvement. It is assumed these processes will help Minneapolis in its five year improvement plan, as well as assist other school districts in using technology.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT AND MAGNET PROGRAMS

Minneapolis is the largest school district in Minnesota, with nearly 37,000 students K-12. Students are enrolled in one of 35 elementary, six junior high and seven high schools. The focus of this project is five of the districts' magnet programs located in the paired North and Edison High Schools. Approximately 2,600 students in grades 9-12 are enrolled at North and Edison. Of those, 630 are involved in one of five magnet programs. These offer an intensive course of study in a specialized area, such as the visual and performing arts or technical careers. Students spend from two to three hours each day in the magnets, with the rest of the day in the comprehensive high school program. The magnets are designed to assist the district's desegregation effort by enrolling students from throughout the district.

These five programs and the two high schools' coordinated media centers are the focus of this project. Each of these is briefly described below.

SUMMATECH (Science, Math, Technology Magnet Program). A program for a broad range of student ability which emphasizes skill acquisition in science, math and computers. It is designed to "acquaint students with what it takes to make it in a technology based world." The program is supported by a partnership between the district and the Honeywell Corporation. During the first year, students take a math course based on their past experience/ability, an interdisciplinary science course based on a theme (such as limnology), and a technology course of two trimesters of computer and one trimester of photography or drafting. In the second and third years, these math, science and technology sequences are continued in a laboratory setting. The fourth year continues these courses and requires an independent research project.

TECHNICAL CAREERS. This is essentially a vocational program designed to prepare students for: an entry level job, a part-time job while pursuing post-high school education and/or advanced standing at the Minneapolis Technical Institute. Programs available are cabinetmaking, television production, commercial photography, design architectural drafting, technical electronics, energy, manufacturing, offset printing.

RADIO BROADCAST. KBEM-FM is a 5000 watt, 24 hour per day, year round broadcast station licensed to the Minneapolis Board of Education. It is considered by project staff to be the most technically advanced radio station in any high school in the nation. It is a four-year academic and work experience program for students interested in some aspect of broadcasting as a career field. Students serve as staff announcers, operator-engineers, studio and remote producers, engineers, news and copy writers and sports announcers. Programs are both locally produced or engineered and acquired from network feeds and two satellite earth terminals. KBEM through its satellite receivers provides programming to a number of commercial broadcast facilities in the Twin Cities area.

VISUAL AND PERFORMING ARTS (VPA). This magnet offers students an exposure to all of the arts and an opportunity to specialize in instrumental music, visual art, vocal and keyboard music, drama or dance. Students are encouraged to take a broad academic program as well as their arts specialty. In 11th and 12th grades, students accept a contract for work outside the classroom which, in the senior year, may include apprenticeships in community arts organizations. Studies include a variety of performance opportunities, attendance at arts event and a variety of residencies and master classes with the Minnesota Orchestra, the St. Paul Chamber Orchestra, the Walker and Minneapolis Institute of Arts, Guthrie and Mixed Blood Theatres and others. The program features an interdisciplinary approach and attempts to integrate technology to support the arts.

These four magnets are all located at North High and make up what is known as the Technology Cluster.

BUSINESS AND SERVICE OCCUPATIONS. Located at Edison High School, this is a vocational magnet allowing students to explore career options and learn marketable skills which can prepare them for: full-time employment on graduation, part-time employment while pursuing further education including advanced standing at the Minneapolis Technical Institute. Technology is used extensively to teach accounting, business data processing, word processing/model office and shorthand. The curriculum utilizes technology to familiarize students with the management of records, the application of electronics used in business and a variety of software and other applications used by office personnel. Advanced students learn computer programming in two or more of the following languages: BASIC, COBOL, FORTRAN, PASCAL AND RPG II. Students learn to use the Hewlett-Packard 3000 mainframe computer, as well as microcomputers and HP and Wang word processing equipment.

B. NEEDS

In 1982, the Minneapolis Public Schools adopted a five year plan to "achieve excellence and equal opportunity" in the district. The plan heavily emphasized the use of technology in support of these broad goals and made resources available to develop the technological literacy of students and staff, to promote the use of technology to support instruction and to provide management support services.

The plan also emphasized the use of magnet programs to achieve racial integration. The assumption is that the provision of highly specialized curricula, not normally available in a high school program, will draw students with special interests from all parts of the city, thereby helping to achieve the appropriate racial balance in the schools.

TDS funds were perceived as a way to promote and improve five magnet programs, each of which has a heavy reliance on technology and most of which are just now becoming fully operational. Staff in these programs believe that technology has not been fully nor effectively intergrated, that magnets are insufficiently coordinated with one another, and, importantly, that insufficient resources have been available for the kind of curriculum and staff development they believe is necessary. In a district of this size, it is often "easier" to allocate local funds to equipment than to salaries, although it is evident that planning and curriculum development are people-intensive and require salary costs.

Minneapolis staff also believe that needs exist for other schools in the district to benefit from the experiences of the magnet programs. Therefore, TDS funds are also targeted to a number of "pilot projects" within the program, the results of which can be shared within the district enabling it to meet its long-term objective of using technology to support and improve instruction.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

Commensurate with its size and some of the goals mentioned here, Minneapolis has a long history of use of advanced technology, both for management and instruction. KBEM radio has been in operation since 1969 and is highly regarded. Hundreds of students have received practical training in a quite sophisticated broadcast operation. Hands-on media experience has been a priority in the district which has access to cable television, maintains two major TV production studios, a large number of video recorders and a large film/video collection. The district has two satellite terminals used for teleconferencing and for reception of a large array of instructional and informational programming. The district has both mainframe and microcomputers, has provided staff training in the use of microcomputers, and each school has access to both the mainframe computers and microcomputers. Each of the magnet programs at North and Edison can demonstrate a large number of specialized applications of advanced technology for science, industrial and the performing arts, business occupations, photography and media, and a variety of other uses.

D. PROJECT GOALS AND OBJECTIVES

The proposal identified five major objectives:

1. To provide access for students and teachers to advanced technology resources.

2. To provide specialized technology instruction for students from throughout the district through the provision of magnet programs.

3. To maintain and further develop those technologies, processes, procedures, and partnerships that permit information sharing between schools throughout the districts, community and state and among busines and industry.

4. To provide Technology Cluster curriculum development and appropriate training programs for staff.

5. To prepare and present Technology Demonstration Site programs for dissemination to other interested parties.

III. PROGRAM RESOURCES

The majority of the TDS grant will be expended for personnel, both staff positions and payment for substitutes and stipends for curriculum development/training. Grant funds support the following 4.4 FTE positions:

1.0 FTE Project Coordinator
.4 FTE Coordinator at Edison (shared between two persons)
1.0 FTE Production Specialist (shared between two persons)
1.0 FTE AV Aide
1.0 FTE Clerk-Typist

The project is governed by an Advisory Board comprised of the coordinators of each of the magnet programs, district resource specialists/consultants, the principals of the two high schools, the Media Services Director and the Instructional Computer Coordinator.

The project is funded in several ways: district contributions, the TDS grant and private/corporate contributions. The district has supported acquisition of equipment over a period of years; nearly $70,000 has been allocated for equipment purchase this year because of the grant award. Local funds also support instructional and administrative personnel. The grant supports professional and non-professional salaries, funds for staff and curriculum development and supplies. Honeywell Corporation will provide slightly more than $30,000 to the Summatech program this year.

IV. PROJECT IMPLEMENTATION

This project has been implemented somewhat more slowly than its original plan envisioned, but now appears to be well underway. The original plan projected that the full-time project Coordinator would be on board by late spring; the position was not filled until mid-September. A number of activities did occur over the summer months, planned and directed by the Advisory Committee, led by the Media Services Director and the Instructional Computer Coordinator. The bulk of projected curriculum development and some technology-related staff development took place during the summer. With the presence of full-time staff, those curriculum development and other projects are now being packaged for distribution, and the pace of implementation has quickened.

The Minneapolis TDS is being implemented somewhat differently than most grant-funded efforts. Typically, projects go through a start-up/developmental phase, and only in their later stages do they begin the process of dissemination/demonstration. In this case, the pressures imposed by the TDS designation have caused the project to emphasize demonstration, leaving developmental work and documentation to occur throughout the year.

The project is being implemented in stages, although they are not necessarily discrete or separate. The first stage, now concluding, was to very quickly establish a project headquarters at North High, develop an operating plan and immediately begin demonstration. The Coordinator had, in fact, been on

staff for only one week when Legislators, Legislative staff and Department of Education staff came to view the project. Other visitors quickly followed, as did a series of regional workshops and inservices.

The second phase, now underway, is in essence a series of steps to facilitate demonstration of the project. This is a large and complex project and it is difficult for a visitor to see it all in a single day or to make contact with staff members and/or materials which can best meet their needs. During this phase, then, staff are developing a system and materials to make it easier for visitors to learn from the project. Staff and Technical Occupations students have produced a videotape on the Minneapolis project and are working on a videotape for each magnet program. In addition, a series of informative manuals are being produced on a variety of topics - descriptions of magnet curricula, a manual on computer aided design graphics (part of a project at the Edison Business magnet), a manual on a learning materials inventory system (a project now underway at the North High Media Center), how to produce a video news program, and one not yet completed on satellite receiving and other telecommunications systems. Other materials on programs and activities within each magnet are planned; for example, a videotape by the Visual and Performing Arts magnet on how to apply stage makeup. The priority goal of all this activity is to both attract and make this large program accessible to visitors.

The third phase of the program is one in which staff will be able to try out a number of new projects within the project site. These can then be disseminated both within and outside the district. For example, over the winter holidays, the North High Media Center staff will be cataloging all media center materials on computer, so that all circulation functions can be automated. The plan is for district-wide dissemination if the system is successful, and may also be something which this project can share with other districts. In some cases these "projects" will be more of a process of documenting existing practices; in others brand new efforts using technology will be tried. One such project will involve computerizing the KBEM newsroom.

This project has heavily emphasized staff and curriculum development. The immediate goal of this activity is improvement of the five magnet programs at North and Edison High Schools. The long-term goal is improvement of instruction district-wide. Project staff believe that professional development is a result of a process of collegial planning and program development, not attendance at formalized inservice sessions. Staff also believe that the magnet programs have been too isolated, and that staff and students can benefit from more communication and cooperation among programs. TDS funds have supported magnet program staff through this process of cooperative dialogue and curriculum development. Courses which have resulted include: the third year Summatech "systems" curriculum; several developed for VPA and Technical Careers students--TV Production/Play Writing, a broadcast news program which students write, edit and produce, -- MPS EVENTS, and Art/Welding; a Radio/TV Acting course for KBEM and Technical Careers; a KBEM/VPA ninth grade Humanities-English class; and, a Dance Careers course. These courses are being provided to students this academic year. Fourteen staff members from Technical Careers, Summatech, VPA and media have been involved in curriculum development.

In addition to the staff development which is presumed to occur as a result of cooperative planning, several staff members have also had opportunities to attend institutes and technology-related seminars, with the support of the TDS grant. Conference topics included, among others, data base searching, and interactive video. The program has also provided staff with opportunities to tour other magnet programs and will provide an opportunity for Edison and North staff to exchange visits, and, hopefully, to have an opportunity to exchange ideas.

V. PROGRAM OUTCOMES

The Minneapolis TDS site appears to have made progress in meeting its two broad goals -- (1) demonstration of its many examples of technology at work in educational settings, and (2) curriculum and staff development in five of the district's technology-related magnet programs.

In terms of demonstration, the project has hosted 244 visitors, some from other schools within the district and others from other school districts and organizations in Minnesota and other states. Visitors have included the Arts in Education delegation from the People's Republic of China, a group of students from Israel and educators from Norway. During this current phase of the project, staff are making greater efforts to encourage visitors. Letters will be sent to all school superintendents in Minnesota, and, as noted, packets are being produced which are intended to assist visitors in learning from the many and varied activities which can be demonstrated at North and Edison. A video presentation overviewing the entire project has been completed, and seven other informational video tapes are in production. Twenty booklets have and will be developed to assist visitors to the site. These booklets will range from general information about programs and related curricula to specific "how to" manuals. This packaging is being done to encourage visitors and to help them make sense of the very large and quite sophisticated technology which is a part of this project.

In terms of curriculum development, seven new courses have been developed by magnet program staff. Many of these courses are interdisciplinary and involve students and staff from more than one program. These courses are currently being implemented; they will ultimately be shared with other schools in the district and with other school districts. There are indications that the planning and development have resulted in greater cooperation between programs and improved communication among staff.

While the project's five objectives are fairly vague, progress has been made in achieving them. At least three of those objectives were underway before this grant was awarded.

Objective one is to provide access to advanced technology resources for students and staff. The students and staff in North and Edison High Schools have access to an amazing array of very sophisticated technology, ranging from microcomputers to an extremely advanced radio broadcast operation. Program staff believe that the designation of the district as a Technology Demonstration Site has encouraged more local contributions for new equipment, as well as encouraging additional corporate contributions for equipment.

Objective two speaks to technology-related instruction for magnet program students. Clearly, the emphasis on technology in these magnet programs existed prior to this grant; however, there are indications that the grant has encouraged better communication among staff in the magnets and has acted as a catalyst to speed up the normal cycle of curriculum development.

Objective three, rather vague, speaks to maintenance and further development of "those technologies, processes, procedures, and partnerships that permit information sharing between schools throughout the district, community and state and among business and industry." It is in this area that program staff hope to pilot a series of "projects" which can be ultimately disseminated to the entire district. These are such things as the computerized resouce inventory, the MPS Events news program, the data transfer of Edison's student manual to the Industrial Arts Graphics Department at the South Campus of the Hennepin Vocational Centers, and other new efforts involving technology. Several of these projects are underway, others will be developed throughout the year. In terms of business-school partnerships, this study has already addressed the relationship of the Honeywell Corporation to the Summatech program. Information sharing throughout the district is now being addressed through the first issue of the TDS project newsletter and the various on-site visits being arranged for Minneapolis staff.

Objective four is actually this project's sole developmental activity. Fourteen staff members have spent hundreds of hours developing seven new courses which are being offered to students during the 1984-85 school year. Staff moreover believe that significant improvements will continue to be made in the magnet program through an ongoing communication and development process.

Demonstration of the project is clearly its major emphasis and significant efforts have been made in this area. Several hundred educators and interested persons have visited the North and Edison sites; others have learned about the program through a series of state and ECSU-sponsored inservice activities. Staff continue to believe this is an essential activity, which would not have otherwise occured, and to which they are continuing to devote significant effort. Aggressive promotion and pragmatic materials to help visitors are now in progress and staff believe that these efforts will be successful.

Staff interviewed during the case study process are enthusiastic about this program and the opportunities it has provided them for dialogue, communication and development of curricula. They believe the TDS designation has precipitated a greater commitment of local resources and energy for staff and curriculum development. Staff are also enthusiastic about the new courses created and the opportunities for student service which they can provide.

It is occasionally difficult for site visitors (and the evaluators for that matter) to separate the grant funded activities from ongoing examples of technology at work in this district. This is, as has been repeatedly noted, a large district and one that has made a substantial commitment to the use of advanced technology. Much of what is available for on-site visitation is very sophisticated. It is likely this level of sophistication has deterred many from participation. The completion and packaging of written curriculum materials, video presentations and other information packages, as well as more aggressive dissemination efforts specifically targeted to the needs of less technologically sophisticated districts will help the project in its demonstration goal.

It is also somewhat difficult for the relatively casual observer to document what is actually occuring with grant funds -- curriculum development is neither very visible nor particularly glamorous. However, this district has used the grant funds to its own advantage and has made strides in the curriculum development process. It seems apparent that continuing dialogue

among staff and continued instructional planning which integrates and effectively uses technology can benefit students in Minneapolis and can ultimately serve other districts as well.

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01/11/85

MINNESOTA VALLEY TELE-NETWORK

CASE STUDY

I. INTRODUCTION

The long range issue addressed by this project is the viability of smaller school districts and communities and their quality of life and educational opportunity. More immediate issues involve maintaining state mandated and student desired curriculum options, keeping qualified staff and meeting their continuing educational needs, helping them to use new technology for instructional purposes. Other issues are: costs and cost-effectiveness, continuing inter-district cooperation, teachers' receptivity to the system and ability to teach on it, curriculum modifications needed, possible community education uses for the system, and will children learn via interactive TV essentially as much as via regular classroom instruction? And finally, if revenues can be generated by off-hours use of the system sufficient to pay operating costs, will this encourage private investment money for the construction of such systems?

Most of these issues can only be addressed a year or more from now because the project is too new. Issues addressed here include planning, interdistrict cooperation, business/school cooperation, staff development and program development. No assessment of the technical aspects of the program nor of actual classes can be made at this point. Present plans presume the system will be operating in January, 1985.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICTS

The Tele-Network consortium consists of nine school districts and Pioneer Public Television, all of which are located in southwestern Minnesota in Big Stone, Swift, Yellow Medicine, Chippewa and LacQuiParle Counties. The principal occupations of area residents are agriculture or agriculture-related. The sparse population and the weather have a bearing on this project.

The dispersed population leads to small school districts, leading to fewer course options for students. It also limits access to cultural, educational and recreational activities for its general populace. As small districts have been consolidated, communities without schools have tended to lose their identity and even to disappear. Districts in this consortium serve communities which no longer appear on the Minnesota official highway map.

The severe winter weather makes travel to other locations for classes difficult, sometimes impossible. Busing students or teachers for shared instruction is a less attractive option here. Teachers, health professionals and others whose jobs require in-service training now must drive 25 or more miles one way to institutions of higher learning for continuing education credits.

Table 1 lists the districts in the consortium with some data relevant to this project.

TABLE 1

POPULATIONS SERVED BY MINNESOTA VALLEY TELE-NETWORK

	Population Served	Area (Sq. Mi.)	Students	Sr. Class Size	% Graduates Continuing Education	School Staff*
Appleton	4,000	325	784	59	83	98
Benson	7,200	400	1,351	127	87	159
Dawson-Boyd	4,300	246	736	50	90	84
Granite Falls	5,500	163	939	72	87	106
Madison	3,750	225	625	58	80	76
Maynard	1,355	113	278	26	85	44
Milan	3,000	134	269	23	75	44
Montevideo	8,424	188	1,661	128	62	209
Ortonville	3,000	150	826	80	118	
Total	40,529	1,944	7,495		938	

* Includes certificated and non-certificated

B. NEEDS-NEEDS IDENTIFICATION PROCESS

No formal needs assessment was required to justify the project since the problems of isolated districts with small and declining enrollment had already been researched. A task force led by Southwest State University and the Southwest and West Central ECSU made a study of the 18 county area in which this project lies and documented the problems faced by most of its school districts. These included: Financial problems, inability to maintain curricula, difficulty in attracting teachers, especially in math and science, the necessity for costly transportation of students or teachers for cooperative instruction and staff layoffs.

Assessment of specific course offerings needed were made and are continuing to be made in the process of planning for the school and community education courses to televised. Each district suggested courses it would like to have available for its students. Community education directors have surveyed school personnel and are surveying the community for information on their professional needs and personal interests in continuing education and recreational programs.

Several consortium districts offered no foreign language and none offered a choice of language. State curriculum requirements will also constitute a need addressed by this project.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

None of these school districts had had experience with interactive TV. All districts have had access to educational TV for classroom use. Some faculty in all districts have had experience in the use of video cameras for non-instructional purposes. Students and teachers in Appleton and DawsonBoyd have produced programs, taped and live, which have appeared on Pioneer TV.

All districts have microcomputers for use with students at the elementary and high school levels. The majority of the staff appear to have received some basic instruction in computers. Usage in instruction varied widely among the districts.

D. GOALS/ANTICIPATED OUTCOMES

This project was funded as a developmental, rather than a demonstration project. It began when State funding was granted. The broad goal of this project is to "meet the communication and information needs in the area; and, to serve as a pilot for the major interactive telecommunications system in all 18 counties of southwest Minnesota." The end product of this pilot project is a system "which can be accessed by education, business, social and public service agencies and organizations, health facilities, recreational and cultural services, government and the general public." Interviews yielded the following:

School District Goals

1. To increase curriculum options for students and to comply with mandated curriculum requirements.

2. To improve accessibility to continuing education for professional and nonprofessional school staff. For example, the state university at Morris may provide an elementary education masters degree program over this system.

3. To improve inservice and continuing education services by sharing costs and planning among member districts.

Community Goals

1. To increase educational, cultural and recreational offerings for citizens in the area.

2. To provide access to training and education for employees of business, health care facilities and other area organizations.

Demonstration/Dissemination Goals (Long-Term)

1. To test whether such a system can generate enough revenue to support the cost of equipment and maintenance through the sale of data transmission services, special cultural or sports programming, movies, courses for business, etc.

2. To demonstrate to others, especially in southwestern Minnesota how such viable systems can be created and supported by linking the member districts with each other, with Pioneer TV and by microwave relay to University of Minnesota facilities at Marshall, Morris and St. Paul.

Anticipated Outcomes

1. Districts will be able to meet state mandated course offerings.

2. Districts will be able to prepare academically talented students for college and will be able to challenge them.

3. Districts will be able to keep well qualified teachers and provide them with continuing education and inservice.

4. Community residents will be able to receive educational, cultural and recreational offerings not now available.

5. Business and professional people will have access to continuing education programs to upgrade skills.

6. Small communities will keep their identity.

7. Other groups of communities will have a model for developing similar programs, including ideas for revenue generation to help support them.

8. Eventually, the 18 county area will be linked in an interactive system of audio, video and data transmission through a variety of means.

III. PROGRAM INPUTS

A. STAFFING/RESOURCES

The project director manages the project (one-half time, assisted by a one-half time secretary), under the supervision of the Board of Directors (superintendents and one school board member from each of the nine participating districts). This Board has met five times. An operating committee (all of the superintendents on the Board) has met formally 11 times. A Principals' Council (principals of all schools involved) has met formally eight times. The Adult Directors Council (adult or community education director of each district) has held six meetings. A Staff Council (one teacher from each district) has met once.

Pioneer TV has been a major resource for this project. Its contributions have been both tangible and intangible. Ansel Doll of Pioneer TV has met frequently with project staff. At least 61 school districts, Pioneer TV and community individuals have been involved in the planning and development of this project to date. Building upon the work of the task force described in Section IIB above, Pioneer TV management provided leadership, technical advice and help in planning the program. The Board of Directors, the Operating Committee and Pioneer TV management also spent many hours in working out a microwave network contract and a consortium agreement.

Districts will rotate as fiscal agents for the project, beginning with Montevideo. Districts' financial commitments are much greater than originally expected, due to reduction of state funds, withdrawal of one school from the consortium and under-estimation of studio outfitting costs. Individual district direct costs are as follows:

$ 5,000	Original "Hard Cash" Contribution
5,859	Additional Microwave Costs
11,165	Cash to Offset Reduction in State Funding and Withdrawal of Clara City from Project
6,250	Committed for Maintenance and Engineering
1,626	Switcher Cost
18,500	Studio Outfitting Costs
1,778	1/9 Director's Salary and Fringes
383	1/9 Secretary's Salary and Fringes
2,111	1/9 Travel and Office Expenses, etc.
$52,672	Total

B. FINANCIAL SUPPORT

1. State of Minnesota

Technology Demonstration grant funds		$125,120

2. Pioneer Public TV

Cash	$112,674	
Value of Tower Location (maintenance insurance, etc.)		
Administrative Time		
Other (value of tower, administrative time, etc.)	$211,507	
Total		$324,180

3. School Districts

ITFS (transmitters at Appleton)	$ 60,794	
Down-converters at Appleton	$ 13,935	
FM Radio and Antennas (Point to point return at schools)	$286,285	
Towers	$ 75,000	
Maintenance/Engineering	$ 26,250	
Switchers	$ 14,634	
Studio Outfitting	$166,500	
Total		$643,398

This does not take into account costs of staff time for inservice or administrative time for project meetings and other business. A review of formal meeting minutes shows that from February 8 to October 22, 1984, committees with a total of 59 members attended a total of 26 meetings. At one hour per meeting (most lasted several hours), that totals 307 person hours.

C. PROGRAM PLAN

"This system will employ four Omni-directional microwave transmitters operating on "ITFS" frequencies and placed on the 1200 foot Pioneer tower; point-to-point microwave transmitters at school sites and aimed at Pioneer tower; new point-to-point microwave interconnects between Marshall, Pioneer tower and Morris; existing microwave interconnects between Pioneer tower and St. Paul, Duluth, Fargo-Moorhead and Brookings, South Dakota; the existing satellite receiver located at Pioneer tower; and television production facilities at participating institutions."

To develop this network required planning in several areas. The following areas were addressed in the proposal:

1. Physical construction: Specifications, bidding, scheduling and construction.

2. Staff development: From awareness for all staff to specific training for teachers selected.

3. Program development: Needs assessment, course and teacher selection, scheduling, logistics.

4. Participation of women, handicapped and minorities.

5. Public Relations: Community awareness and cooperation.

6. Expansion of network: Consulting with other clusters of schools in area serving as demonstration site.

7. Continuing funding: This was conceived as a three-year developmental project.

8. Long-range planning.

(Not listed, but necessary, were the development of a consortium agreement and microwave contract.)

Superintendents and/or principals were interviewed in seven of the nine member districts. In their judgment, planning for this program by project staff and committees has been of a high order. Clearly, time estimates were unrealistically low. Some teachers interviewed felt that they entered the process a little too late.

Courses were to begin in September, 1984 for high school students. Foreign language for elementary students and some community education programs were to begin in January, 1985.

D. TARGET POPULATION(S), IN APPROXIMATE ORDER IN WHICH THEY WILL BE ADDRESSED

High School Students
Elementary School Students
School District Staff
Community Residents seeking job-related continuing education
Community residents seeking educational, recreational, cultural activities for personal enjoyment
Preschool school students
Business people, including farmers seeking information/data (e.g., agricultural marketing data)
Representatives of other districts in the 18 county area

IV. PROGRAM PROCESS

A. IMPLEMENTATION BY AREAS DEFINED ABOVE

1. Development of consortium agreement and microwave contract were completed in October, rather than by March 30. This caused a delay in other areas. The FCC license was delayed due to the huge backlog of applications following deregulation. The license has not yet been granted. Construction of the 1200 foot tower at Appleton was delayed by weather, the British dock strike, and the complexity of the custom construction. Bids on individual school equipment were delayed until the contract agreements were completed. Construction of towers at school sites and equipping of studio/classrooms began in late November.

2. Staff development activities have taken place on schedule. All districts received "awareness" level inservice in the spring of 1984. Teachers scheduled to teach on the system as well as a few others attended a summer three-day training session. Five teachers participating in this workshop were interviewed. They found the training, including microteaching, very helpful, but feel that they should have time to practice teach on the interactive system.

3. Program development activities took place on schedule. School calendars and schedules were reconciled, needs assessments were conducted, and courses and teachers selected.

4. Participation of women, handicapped and minorities has not been specifically addressed as yet. It is argued that this project is designed to serve the educationally handicapped--those whose educational options are curtailed because they live in a sparsely settled location. Likewise, the physically handicapped will be served by closer access to continuing education programs.

5. Talks were given to civic groups and articles published in school and local newspapers when the demonstration site proposal was being written. Since then, little publicity has been sought so as not to raise expectations too soon. Community education surveys sent to most residents in fall 1984 have publicized the program.

6. Expansion of Network. The project director and Pioneer Public TV staff have been meeting with representatives of other district clusters wishing to develop similar programs. Materials developed are distributed by SW/WC ECSU to these groups.

7. Continuation of Funding. The consortium hopes for continued state funding of this project. No other sources have been sought. Pioneer Public TV is exploring revenue sources such as data transmission, subscription movies and sports events.

8. Long-range planning is reflected in the selection of equipment for the project. If this equipment will be used in an 18 county network, broadcast quality must be good. Beyond this, the microwave contract provides that revenue generated by Pioneer TV during non-school hours (late night, weekends, some summer hours) will be shared, after costs, equally with the consortium. These funds can be used for system maintenance or expansion or curriculum development. Strategies for other district clusters include searching for existing structures for mounting transmission equipment and using under utilized transmission systems owned by utilities or other businesses.

B. DISCREPANCIES FROM PLANS

The project is not on schedule, due to construction delays and delay in completion of contracts. At this writing, the projection is that there will be classes on the interactive TV starting during the second semester of this school year. The design of the plan has not changed.

C. INTERDISTRICT COOPERATION

A high degree of interdistrict cooperation was required for nine districts to adjust school schedules and calendars to accommodate the TV classes. The fact that districts have stayed with the programs in the face of increasing costs constitutes another example. Superintendents, principals and board members surveyed and/or interviewed agreed that although there has been disagreement on particulars, cooperation among districts has been exceptionally good. This they credited to past experience in working together and to good project leadership.

V. PROGRAM OUTCOMES

A. SUCCESS OF IMPLEMENTATION

The success of the project cannot be assessed until the system is on the air. No outcome objectives have been achieved. Process objectives dealing with the program were achieved on schedule (see Section III, C above).

1. Construction of the system is not complete, and is proceeding slowly at this point.

2. Staff Development. Teachers interviewed who were not involved directly in the project reported that they were informed about it during the spring of 1984. They had no strong feelings about it and only with some probing expressed fears that this could become a threat to their jobs. Several indicated that TV would not lend itself to their kind of teaching, (e.g., special education; an English teacher who moves about a great deal to dramatize literature; shorthand teachers who would have difficulty correcting the typed transcription; a physical education teacher). Teachers look forward to the possibility of receiving continuing education courses via the system, rather than driving many snowy miles to Morris or Marshall.

Teachers interviewed found the three-day training well worthwhile and felt competent to teach on the system. They hope and expect to be given time to practice on the system before facing their students. They did not feel that they had been coerced into cooperating with the project, although one indicated she wasn't sure she had a choice in the matter. Two of the teachers interviewed also said that they would have liked to have been consulted earlier in the equipment selection process; although they will now will have what they want, the process was unnecessarily complicated.

Curriculum expansion will take place for most schools with the five classes scheduled to run during second semester. Table 2 shows the courses currently available in each district and those to be carried on interactive TV. No courses will be dropped to make room for these.

TABLE 2

Current Curriculum Offerings

	French I	German I	Spanish I	Farm Management	Music Theory
Appleton					
Benson	#O				
Dawson-Boyd	O	O	O		
Granite Falls	O	O	O		
Madison	#O	O	O		
Maynard	O	#	O	O	O
Milan			O	O	
Montevideo		O	#O	#O	O
Ortonville	O	#	O		

# = Now Available
O = Scheduled for Tele-Network

Four new continuing education courses are scheduled for winter, 1985: 1) a 3-credit course in elementary reading from S.W. State, 2) a commodity trading course for farmers, 3) an in-service session for Head Start teachers, and 4) an "assertive discipline" course for parents.

3. Program Development. High school courses were ready to go on schedule had the system been ready. Community education directors are enthusiastic about the possibilities of the system and have received good responses from surveys of school staff. Surveys were sent with the fall program brochures and 175 responses had been received by November 15. Community education courses were not scheduled to begin until January 1985.

4. No effort was made to assess community awareness because little effort had been made to publicize the project.

5. Expansion of Network. The project director has met with representatives of six other groups of schools in the 18 county area. He has shared engineering and program information with all of these groups. Experts consulted by Pioneer TV judge that this areas's population is sufficient to generate revenue to offset operating costs of the project, once programming is in place.

6. Continuing funding will be sought from the state.

7. Long-range planning has not formally taken place.

Outcomes

On the positive side, there has been much good leadership, good planning and good cooperation in this project. Teachers chosen to teach in the system are quite willing to do so and feel they will be given a chance to practice. One said "I want to make sure if it's not good it's the fault the technology, not mine." Principals say they are sure there are good teachers available within consortium schools to teach any subject they would want to offer "Or we'll go out and hire one." Dealings between Pioneer Public TV and the consortium, strained at first, appear to be on a sound, cooperative footing now. This is an example of business/school cooperation from which both may benefit. The use of Pioneer's 1200 foot tower made this project economically feasible. Students interviewed, who had signed up for the TV courses, have positive attitudes toward the program, although they are disappointed not to be getting the courses this semester. They see this project as broadening their curriculum options. Students are able to articulate many benefits of small schools and they see this program as a means of alleviating its shortcomings.

In spite of all the delay, people interviewed were still enthusiastic about the possibilities and hopeful that the program will be operating during second semester. Districts' willingness to increase their financial commitment shows their continued belief in the project.

Teacher/administrator relations appear to be good, so there is no militancy against the program. Plans to use the system for the benefit of teachers seem designed to forestall opposition.

On the negative side, the project has been technologically much more complex and expensive than had been anticipated. It has been delayed to the point where this evaluation cannot deal with outcomes at all.

There was some disagreement among districts about what to do when the TV courses were not available. One principal wanted to give the courses anyway, busing students or teachers. This was not done. One school hired a foreign language teacher, so those students will not take the TV course when it is offered in January.

Some teachers feel that they should have participated earlier in the planning of this project and there is some concern that it may, at some future time, constitute a job threat.

D. PERCEPTION OF PROJECT LONGEVITY

Because the need is so great, the planning so thoughtful, and the level of commitment and cooperation so high, the prospects for this project's life appear good. This is clearly a developmental rather than a demonstration year.

SNYTHESIS/SUMMARY

Unique to this project is the cooperation of a public TV station, with all its resources and technological sophistication, and nine school districts. This increases the potential usefulness of the project to its own members and also to many other districts in the area or in other areas served by public or private TV stations. Rare, if not unique, is the broad range of constituencies to be served and the range of services envisioned.

Cost is a major issue for this program. The equipment required is expensive to purchase, install, and maintain. Complexity is another issue. A great deal of planning, adjustment and accommodation of different interests and methods of operating is required. Choice is another issue. What uses will actually be made of this technology; will it serve the most important school and community needs? The trend among small school districts in isolated areas is toward cooperation in various ways in order to provide adequate educational opportunities, conform to curriculum regulations and maintain their existence. This project illustrates one form this cooperation might take.

A most interesting aspect of this project is the modeling of cost saving and revenue generating features. Cost savings occur when a system attaches itself to existing facilities such as the Pioneer TV tower. If the partnership with business and Pioneer TV helps that business generate extra revenue to offset additional costs, other businesses will be more likely to look favorably on such partnerships. Pioneer TV feels the community development is good for its future. Utilities and other businesses may share this feeling.

To test the above hypothesis will take more than this school year, probably more than two years. This project was originally envisioned as a three year development and demonstration effort. The major outlays of money have been made, but resources will still be needed to expand the program into the areas planned for. Evaluation focusing on costs and revenue generation would be in order.

Questions remain about uses of the system for continuing education. Will the kinds of teachers used in community education programs be willing and able to teach on this medium? Will institutions of higher learning offer courses on the system with schedules that will allow the teachers to use the credits earned for changes in salary? Will the community support the offering of courses over TV which will require that they go to a high school setting for the reception of the interactive programs? The answer to these questions will also have to wait for some future evaluation.

DM/MH:sjS118j
01/02/85

NORTHEAST EDUCATIONAL TECHNOLOGY CONSORTIUM (NEETC)

CASE STUDY

I. INTRODUCTION

The major issue faced by this project is one of providing the hardware and the necessary training for school staff so that they can: a) train students in the use of such equipment and b) use it to manage or enhance the instructional process.

Students need to have experience with technology if they are to succeed in higher education or the job market. Teachers can use technology to reduce the burden of classroom and instructional management. It can be used to reinforce skills already taught or to teach new skills.

For small school districts, computer taught courses may be a means of increasing curriculum options, thereby meeting state requirements and student desires. In some cases, district survival may be at stake.

Interdistrict cooperation is a theme. Ranging in size from very large to tiny, these eight district recognize common needs and are addressing them together. They are sharing equipment and pooling purchases for quantity discounts. With the disparities in size comes the question of domination of the small by the larger districts. Business-school partnership is another theme. Each group sees its interests being served by this association.

How well this project has addressed these issues cannot be measured at this early date. This report will describe activities taken as of November 15, 1984 and make some judgments about them.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICTS

The NEETC consists of eight school districts at the western tip of Lake Superior in Carlton and St. Louis counties in partnership with the Control Data Corporation (CDC) based in Minneapolis. The principal area employment is in lumber, paper, railroad and mining industries. health care and other service occupations. These districts vary widely in size, socio-economic levels and economic health. All have suffered from the recent recession and from declining enrollment. In the smaller districts enrollment decline has made it increasingly difficult to maintain an adequate curriculum selection. Budget constraints had kept down purchases of high technology equipment and providing training in its use. Table 1 presents some facts about consortium member districts.

TABLE 1

Consortium District Demographics

	Population Served	Area (Sq. Mi.)	Student Body	Senior Class Size	% Continuing Education	Staff Size*
Barnum	3,000	200	720	48	60	63
Carlton	3,263	101	849	68	64	62
Cloquet	13,000	96	2,261	194	60	135
Duluth	92,000	125	13,221	1085	51.8	839
Esko	4,014	40	974	71	70	53
Hermantown	7,894	92	1,453	110	60	101
Proctor	11,100	150	2,268	171	60	154
Wrenshall	1,644	105	378	32	75	28
Total	135,975	909	22,124	1,779		1,435

*Certificated FTE

B. NEEDS/NEEDS IDENTIFICATION PROCESS

The primary long-range need addressed by this project is the need to prepare students to live in a high technology society. This requires both equipment and information about how to use it. Secondly, but important, is the need of schools to maintain curriculum options including state-mandated courses in the face of declining enrollment. The improvement of instruction is an ongoing goal. Many of these districts feel the need to provide community education programs in high technology as a service to their under- employed adult community.

Technology Utilization Plans were prepared simultaneously with writing this project proposal, so people involved with the needs assessment included TUP committees of each school, district computer committees, PER committees and Community Advisory Committees.

In the shorter range, the districts identified specific subject or program areas in which instructional needs could be met by the application of technology. The initial list was prioritized by all districts resulting in 17 needs to be addressed in this project. Taking part in this needs assessment were the superintendents of all eight districts, working with computer coordinators, principals and others as appropriate in their districts and the Duluth Chamber of Commerce President.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

Districts and schools within the districts varied widely in their use of high technology. All had 16-mm. film and equipment, filmstrips and other projection equipment. Many had electronic typewriters for office use and some instructional use. Several had made instructinal use of TV cameras and videotape equipment.

Microcomputers were used in all districts primarily to teach computer literacy and programming, rather than as instructional tools. Numbers of microcomputers ranged from 14 in Barnum to 184 in Duluth. Duluth Washington Junior High had introduced computers into the regular curriculum in a typing/word processing class. Duluth had used computer networking to maximize students' experience with computers. Duluth was using the Winnebago library system, Esko had CAM and Carlton the Houghton Mifflin Reading Management System. Instructional use of computers in classrooms was mostly limited to drill and practice.

Staff in all schools had received at least some training in computer awareness or literacy, but few teachers were using computers. About 750 of Duluth staff had completed a ten-hour beginning course in computer technology and an estimated 250 had taken a second ten-hour course. Only Duluth had a curriculum guide in computer literacy.

Other high technology equipment such as for science teaching was virtually nonexistent. Cloquet had used large screen display of computer software in science classes. Duluth's special education program had begun to use voice actuated computer and auditory trainers. Several districts had initiated TV programs for cable cast within or outside their schools.

D. GOALS

The broad goals for the project are four:

1) Upgrade basic skills (math, science, social studies),
2) Enhance advanced level instruction (science, business),
3) Train staff to successfully integrate new technology into their classrooms and to use more adequately existing technology, and
4) Open up instructional options to teachers using instructional technology and technological linkages.

Major desired outcomes of the program as gathered from interviews and surveys include:

1) Staff training for competence in high technology (the most often mentioned),
2) Enhancing course offerings, especially at higher levels,
3) Integrating technology into the curriculum,
4) Individualizing instruction, and
5) Better preparing students for higher education or for work in a high technology society.

III. PROGRAM INPUT

A. STAFFING/RESOURCES

The project office is located in the Duluth Public Schools, which serves as fiscal agent. The project director reports to Duluth's Assistant Superintendent for Instruction. Project management lies in the Board of Directors (superintendents of the seven smaller districts and Duluth's Assistant Superintendent for Instruction). Three of these people were active in conceiving the proposal and all have been active in planning the project's operation. Computer coordinators in all districts have shared in both planning and operations.

The project budget provides for a full-time director; a half-time technician who shares staff development duties with the director, four 1/4 time subject area specialists, and a half-time secretary.

Control Data personnel spent much time planning with project staff for the CDC part of the project. Their total time commitment will amount to 200-300 hours of consulting during this project grant period.

B. FINANCIAL SUPPORT

State of Minnesota

Technology Demonstration Site Grant (includes $25,508 paid to CDC)		$125,120

Consortium Districts

For Apple computers and peripherals	$411,838.88	
To CDC (excludes State funds)	$106,492	
For science equipment	35,028	
	$553,358	$553,358

Control Data

Phone line and multiplexer, printers	$119,000	
Consulting	5,000	$124,000
	$124,000	$803,478

This does not include costs for computer labs, wiring, furniture and security or contributions in staff time by the various districts. Superintendents of the districts have met at least monthly since the project was funded. Not included also are project overhead costs for space, utilities, secretarial service, fiscal management, etc., which are provided by the Duluth Public Schools.

C. PROGRAM PLAN

Seventeen identified areas of need were addressed by the project. They are discussed individually in the following section on "Implementation".

In-service training is a major component of this project. The director was to arrange for or conduct in-service sessions on general computer technology, as well as in the use of project equipment. The involvement of CDC in the program consists in the following.

1) Twelve stand alone microcomputers (9 in Duluth, 3 in Cloquet for on line or stand alone use of CDC software. Three CDC Viking computers (1 each in Barnum, Carlton and Wrenshall) which will operate on line to the mainframe CDC computer in Minneapolis.

2) A dedicated phone line between the mainframe CDC computer and Duluth, with multiplexer permitting direct dialing from other consortium schools.

3) Sophisticated printers (3 in Duluth, 1 in other four districts) which will print from the TV screen. These will be useful in grading, preparing course manuals and diagnosing student problems or needs.

4) PLATO courseware, most of which will be designed for the CDC 110 micros. The schools will select what they wish to use from this array.

5) Consultation/Training. CDC staff have consulted on the technical aspects of the system and provided two full-day workshops in its use. The project director received a day's training at CDC headquarters, so that he can train teachers. CDC staff will also catalog the learning objectives of its courseware to match the districts' school and text objectives in upper level math and science.

6) The project director will provide CDC with a mid-year and end-of-year status report. Objective data will be collected automatically as students use the courseware (e.g., usage, correct responses, course completions, etc.).

D. TARGET POPULATION

The first target audience for this project is the staff of the eight district 1,435 individuals. Second are the 22,124 students in the eight districts. No significant impact on the community-at-large is expected during this project year.

E. POTENTIAL BENEFICIARIES

Teachers should benefit from the programs for better management of instruction, a wider array of methods of instruction and up-to-date equipment. Students should benefit from the same advantages, plus the much greater variety of courseware available through the PLATO system.

IV. PROGRAM PROCESS

A. IMPLEMENTATION

The project is getting under way more slowly than anticipated. Deliveries of equipment were slow because of huge national demand. Inventory, testing and marking of equipment required considerable time before items could be released to schools. Installation of the phone line to CDC and wiring for computers took longer than expected. By October 22 all equipment was in place and operating, except the MCIS guidance system. The consortium never planned to have every component of the project operating in every district, but to have each area addressed in one or more schools. The 17 areas of need have been addressed in varying degrees as described below:

Elementary Math: All elementary schools have additional microcomputers available in each classroom for use with MECC's LOGO program. Methods of use vary among schools.

Secondary Business: Every high school and most junior high schools in the consortium now have computer labs with enough computers to conduct classes in keyboarding--usually taught at grade 7 and 10 or 11. Most high schools also have computers in their business departments, teaching word processing with typing and data management with accounting. Washington Junior High School's typing lab has been replicated in another Duluth school.

Elementary Math: All elementary teachers now have access to computers and math drill and practice programs.

Secondary Science: This is an important program emphasis with two components:

a) Grant funds were used to purchase ten electronic balances and ten PH meters (one for each high school in the consortium); seven spectrophotometers (3 for Duluth, 1 each for Cloquet and Hermantown, 2 shared among other four schools); 3 spectrophotometers and 3 microvideo cameras (1 for Duluth, 2 shared among 7 other districts). Two in-service sessions were held in October for demonstrating use of this equipment and the items were distributed according to plan.

b) Grant funds of $25,508 and district funds of $113,500 were paid to CDC for hardware and software to establish the PLATO system in secondary math and science.

Support Services: Barnum has added the Winnebago library management system, so the project can now demonstrate this system in very small and large school settings.

Minorities: Guidance counselors have equipment in place, but at this writing are awaiting loading of the MCIS program. Computers are in place for Duluth's jail and teen parent programs. N.E. Correctional Institution will also be using MECC programming, through Proctor schools.

Women: Software for this area is not yet in use. Female students are encouraged to take all computer-related courses.

Secondary English: Not much use has yet been made of word processing in secondary English because of limited hardware and the need for students to develop keyboarding and computer literacy skills first.

Elementary Science: Computer networks were not purchased in this project. Duluth has offered to share transporter cards and wiring hookups to other districts for demonstration of such networks in elementary science; as yet, this has not occurred.

Handicapped: Special education teachers in all districts make extensive use of computers for drill and practice. Duluth has adapted some computers for use by the physically handicapped. Other projected uses of high technology for the handicapped have not yet materialized.

Elementary Science: Planned equipment has not been purchased.

Counseling: Delivery of MCIS disks was delayed until December 1, so counselors have not yet put them to use with students.

Reading: Reading management systems are now installed in Esko, Carlton and Duluth offering comparisons between systems, use of floppy and hard disk and different school sizes.

Secondary Vocational: Duluth demonstrates the use of Computer Assisted Design (CAD) which is being used in mechanical drawing and architectural drafting at Denfeld High School. Denfeld also shows computer assisted machining which students can program to make patterned cuts in wood. Fight simulators are available at both Denfeld and East High Schools in Duluth. Duluth's Hero II robot demonstrates some of the functions of robotics--programming, sensing, adapting to information received, simulated speech. Duluth will demonstrate this for other schools.

School Management System: Two similar systems are shown in Duluth secondary schools. The one observed used an Apple II with hard disk, which is used half for scheduling and half for attendance. Teachers code marked sense cards hourly. These are machine read daily and when a student accumulates a critical number, a letter to parents is automatically typed. The data are also useful for guidance counseling and court cases. This pilot program is being disseminated nationally.

Community Education: Some upgrading of equipment has occurred, but not what was originally planned because of high costs. The half-hour "happenings" program has continued over public TV.

B. DISCREPANCIES FROM PLAN

A few planned equipment purchases were not made (e.g., 13-station Commodore networks, "adapted" typewriter, video equipment for PBS Happenings show, CMC billing machine, and hydraulic unit). The project staff was reduced by the removal of the four quarter-time subject area specialists. However, this cost became a Duluth "in kind" contribution. Also, the half-time secretary was not hired; her duties are being performed by Duluth schools' personnel.

The project is also behind its anticipated schedule, primarily because of delays in receipt of equipment (due to heavy manufacturer's backlogs), the time required to inventory, test, and mark equipment, and the delay in getting phone lines connected for the CDC portion.

C. INTERDISTRICT COOPERATION

This project has required considerable interdistrict cooperation. Superintendents from Cloquet and Carlton and the assistant superintendent from Duluth were its prime movers. Superintendents indicated that relationships among districts and between Duluth and the smaller districts have been excellent. The push for CDC involvement came from the smaller districts; Duluth joined in that part only when it threatened to flounder because of the pullout of three smaller districts. One superintendent said that Duluth had "bent over backward" to be fair to the smaller districts. Another, however, wondered if Duluth were benefitting more than the smaller districts. Cooperation between CDC and the consortium is reported also to have been excellent.

V. PROGRAM OUTCOMES

A. SUCCESS OF IMPLEMENTATION

As of December 1, 1984, all equipment is in place and operating. Computer labs are operating in all secondary and many elementary schools, business classes have computers and word processors for office practice and accounting classes. All students at the secondary level will receive some training on the computer.

Probably one or two English classes will have sufficient equipment to use word processing as a tool for teaching writing. All relevant science classes will have the new equipment on a permanent or rotating basis. Six high schools have already used the microvideo camera and all teachers are delighted with its versatility and value.

The CDC equipment is operating. At this writing, teachers are still becoming familiar with the hardware and the array of PLATO courseware. Student use has been minimal. Cataloging CDC objectives in terms of school objectives will probably require most of the school year. The PLATO system increases enormously the curriculum options in each school. One student interviewed after completing a PLATO program said that he "Had learned more in ten minutes than I learned in my eighth grade chemistry class." A science teacher who is using PLATO with his students is very pleased. The evaluator reviewed two short programs, finding one excellent and one with some confusing "garbage" in it (which the sales representative said was probably the result of the videotape, a demonstrator, having been subjected to abuse).

All elementary classes will have access to a computer either in the classroom or in a computer lab. Computer literacy is a part of the elementary curriculum in all schools.

In-service courses have been conducted by project staff, MECC staff and CDC staff. Teachers and superintendents interviewed indicated satisfaction with the programs. Formal evaluation data from two workshops were overwhelmingly favorable. Computer classes in Duluth are regularly over subscribed. Programs have been disseminated within the consortium (typing lab, reading management system). The impact of in-service training cannot be measured at this early date.

B/C. OBJECTIVES ACCOMPLISHED/OUTCOMES

Student impact has been minimal since the project has been operating for such a short time. Advanced level instruction in science and business have clearly been enhanced by the addition of up-to-date equipment. The microvideo camera has been especially well received. Not only can the entire class see one microscope slide, the image can be videotaped for future use when the camera is in another school. Business education has been enhanced with word processors and computers for "spread sheet" and data management programs.

Staff have been and are being trained to use all equipment requiring training. Superintendents judged that their faculties are becoming more knowledgeable about technology, but much more in-service will be required to integrate technology into the curriculum. Instructional options have been considerably increased for all elementary teachers and many, if not most, secondary teachers.

How these options will be used remains to be seen. Some elementary teachers have complained that too many changes are taking place at one time and they feel over burdened. Some teachers, close to retirement, are not interested in making the effort to master new technologies. Some teachers feel that the emphasis on computers will reduce the time spent on teaching the basic skills. There are still many teachers not participating in the project.

Software remains a problem; good software is scarce, expensive, and sometimes difficult to coordinate with text and curriculum. This project has been enormously expensive and has created the demand for even more hardware and software. Other aspects of education may be short changed as a result.

Unanticipated outcomes include the stimulation of cooperation among member districts in other areas such as "Right to Know" legislation. Three districts are planning an interactive TV program for 1985-86. Two others are sharing a foreign language teacher. A supplier of science equipment interested in uses of the microvideo camera donated a large collection of slides to the consortium. Most important, the state grant stimulated some local districts to invest even more heavily in technology than was required by the project proposal, and local business donated funds to this project as a demonstration of support. An unanticipated problem was the need for security for this equipment, including alarm systems.

Dissemination activities outside the consortium have included presentations to state-sponsored high technology conferences and the Grand Opening of the Technology Demonstration Site on October 23. Most of the equipment was on view in operation. An estimated 500 people attended this function.

D. PERCEPTIONS OF PROJECT LONGEVITY

Since the equipment is in place and at least some staff in all districts have been trained in its use, there is no doubt that much of this project will continue. Some changes in staff development activities and the CDC involvement will probably occur if no further outside funding is received.

VI. SYNTHESIS/SUMMARY

Unique to this project are the inclusion of high technology science equipment and the computer network among member districts and CDC. For the schools, this latter brings a huge increase in curriculum options, plus experience for students in the use of computers. For CDC, it provides field testing of a marketing concept in business management of part of the educational process. Such arrangements have taken place on a small scale in Duluth with most driver training (and some janitorial services) being performed by private business.

As computer technology enters into the schools, a kind of "catch up" process has to occur. Computer literacy is being written into the curriculum of the early grades and students here are developing skills rapidly, but upper grade students also need to acquire these skills. Word processing will be required by the University of Minnesota at Duluth in the fall of 1985, so there will be a kind of discontinuity in the curriculum until the students now in elementary reach high school. Then, keyboarding skills and beginning programming may drop out of the secondary curriculum entirely.

A problem voiced by one superintendent regarding the PLATO system (and, by implication, other computer courses) is the matter of determining course credit. A great deal of work is needed to establish congruence between computer courseware and high school credits. Another superintendent suggested that the computer would be more useful in education if/when text publishers begin producing software to accompany or replace portions or textbooks.

The enormous expense of equipment and software is a real problem for most districts. Each purchase seems to beget increased demand. The people involved with this project believe that the schools have no choice but to provide students with high technology, because the world will demand that they be competent in its use. If this is true, questions of cost- effectiveness are not entirely relevant. Although this project was funded as a demonstration site, much of its focus to date has been on the development of new programs. A visitor to one of the consortium schools would not find examples of high technology in use in every school. Rather, one would find some interesting uses of technology scattered around the districts. Some teachers are thoroughly in the high technology swim, most are tentatively testing the water. Dissemination so far has occurred primarily within the consortium. The CDC involvement, expensive and complex, should not be allowed to over shadow the creative use of cooperative purchase, and training for the use of, other high technology equipment. This project has much to demonstrate to other school districts in Minnesota.

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SHAKOPEE TECHNOLOGY DEMONSTRATION PROJECT
CASE STUDY

I. INTRODUCTION

The Shakopee Technology Demonstration Project is an extension of a microcomputer program which was first developed in the district in 1982. The program is a combination of Local Area Networking, a system of interconnecting microcomputers to allow shared access of data or programs, and a mathematics curriculum developed for microcomputers. The district intends to expand the mathematics curriculum and networking system to three elementary schools, the Cooperative Area Learning Center, and the Womens' Correctional Institution in Shakopee.

The Technology Demonstration grant will allow the project to demonstrate technology applications which are seen by the staff as solutions to problems of many small school systems, including: increasing class sizes, maximizing instructional time with computerized record-keeping, and providing opportunities for individualized learning in a range of learning environments.

The Shakopee Demonstration Project is an "expansion" project. While the project's developmental focus this year is implementation and in-service of the math software in grade six, the program is demonstrable in other areas. Visitors to the site can observe the hard disk networking system in elementary, junior high, and senior high math programs and a variety of computer laboratory configurations.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT

The Shakopee School District is located in a community of 10,000 residents approximately 15 miles southwest of Minneapolis. Serving a total enrollment of 2,200 students in grades K-12, the district has three K-6 elementary buildings, one junior high for grades 7-9, and one senior high for grades 10-12. Shakopee Superintendent Dr. Robert Mayer has been with the school system for thirty years. The district administrators are concerned by the increasing class sizes, cutbacks in staff, and lower student achievement scores which have confronted the school system during the 1980's. The teachers have a range of professional experience from second year teacher to veteran. Elementary and secondary staff are currently teaching to objectives and participating in teacher effectiveness training. The community has offered some financial support for education; local businesses raised $5,000 in 1983-84 to help support the computer program. The school board views the advent of computers in education as a pragmatic solution to large class sizes and staff cutbacks.

B. NEED

The project intends to demonstrate the use of local area network systems as an answer to the problems in teaching with stand alone microcomputers and disk drives. These problems included the need to purchase and maintain separate disk drives, the need to purchase and protect multiple copies of software, and associated problems with classroom management which were seen as reducing time for instruction. In 1981-82, Shakopee purchased a Corvus Omninet Local Area Network (LAN) to link up to 63 Applie IIe microcomputers at a time for instruction and reduce management problems.

Local area networking is a hardware configuration which connects several microcomputers using a hard disk storage system. In Shakopee, the local area network is an alternate delivery system using a Corvus 20 megabyte or 45 megabyte Wincester hard disk to interconnect the microcomputers in computer laboratories. The 20 mb. hard disk has the capacity of over 100 standard floppy disks; information from over 300 floppy disks is stored on the 45 mb. hard disk. Any class of students, up to the limit of the LAN system, can work simultaneously on any number of drill and practice exercises, reinforcement activities, or tests available on the courseware. The math courseware was designed for use on the LAN and allows teachers to divide their classes into two groups which alternate one day of regular instruction with the teacher and one day in the computer lab. The approach was initiated to reduce class size and individualize instruction without adding new staff.

C. PREVIOUS HISTORY OF TECHNOLOGICAL UTILIZATION

The Shakopee school system was one of the earliest districts to work with TIES in educational computer timesharing services in 1975. Microcomputers were introduced into the junior high school in 1979 to teach computer programming and provide remedial math and spelling instruction. In the fall of 1981, Gary Volding, the Shakopee TIES Coordinator and ninth grade algebra teacher, approached the superintendent with an idea to initiate a junior high school computer networked lab. A proposal was submitted to CQE and funded, but the district chose not to accept the grant because private funding had been secured to implement the project.

Volding took a five year leave of absence from the school district to start Ideal Learning, Inc., in July 1982. A letter of agreement between the corporation and the school district provided Shakopee with math and other courseware developed by Ideal during the five year period at no cost. In return for the math software, the district provided space for Ideal Learning, access to microcomputers for software development, and allowed visitation by interested groups.

The Integrated Classroom Learning System (ICLS) system courseware was developed in 1981-1982 by the Shakopee School District and Ideal Learning, Inc. The first software program, a full year ninth grade algebra course, was offered in the junior high school during the 1982- 1983 school year. Additional math software was developed for grades 7 and 8 by math teachers in Shakopee and the surrounding communities who were employed by Ideal Learning during the summer break.

Junior high math teachers liked the program and recommended that the software be expanded for use throughout the district. In the spring of 1983, the Board of Education chose to put a local area networking system in the Shakopee Senior High School. ICLS classes in advanced algebra, geometry, and calculus were programmed to correlate with the senior high math curriculum. In 1983-84 the sixth grade math software was written. Currently, the district is working with Ideal to develop math courseware for grades 4 and 5.

The district has one computer lab in each elementary school with 14 stations, linked with a Corvus 45 megabyte hard disk. The junior high has one computer lab with 30 Apple stations and a Corvus 45 mb. The senior high has two computer networking systems, one instructional lab with 14 Apple computers and the other dedicated to administrative and word processing purposes.

D. PROGRAM GOALS

The Shakopee Technology Demonstration Project presented the following major objectives:

1. To maximize teachers' instructional time using the LAN and courseware for it, including record-keeping systems.

2. To effectively deal with increasing class size.

3. To allow the high potential student to progress at her or his own pace.

4. To provide quality cost-effective instruction for homebound students.

5. To provide the absentee student a highly individualized method for accomplishing makeup work.

6. To provide a highly individualized method of review for all students at the beginning of the school year using courseware pre-tests and scoring options.

7. To provide all elementary students with keyboarding instruction to develop proficiency necessary for further integration of computers into the instructional process.

III. PROGRAM PLAN

A. STAFFING

The Shakopee project is co-directed by Ron Ward, technology coordinator and assistant principal of Shakopee Junior High, and Leon McNellis, an elementary teacher and technology instructor in the Shakopee district. The project also has a full-time secretary funded by the Demonstration grant. No advisory committee has been planned for the project.

Ward and McNellis have effectively departmentalized their roles into administration and technical supervision respectively, with both participating in the demonstration/dissemination activities. McNellis was hired in June as part-time co-director to purchase microcomputer and LAN hardware, set-up the computer labs in the three elementary schools, and develop a district in-service plan for technology. In the fall he began full-time responsibilities assisting administrators, clerical personnel, and teachers with technology applications. He has also coordinated in-service activities on financial spreadsheets, word processing, uses of the computer lab, setting up the Apple, Data Handler, Krell LOGO, and E-Z Pilot. Ward provides administrative support and in-service, manages the project, and its dissemination/demonstration aspects.

B. FINANCIAL SUPPORT

Support for the Shakopee Technology Demonstration Project is shared between the school district and the state Technology Demonstration grant. The school district general fund provides the project with personnel. The demonstration grant will enable the district to purchase one Corvus hard disk network and Apple IIe microcomputers for each of the three participating elementary schools. The Carver-Scott Cooperative Learning Center

will acquire one Corvus LAN and five microcomputers, and the Minnesota Correctional Institution for Women will receive one LAN system. Ideal Learning will make available the math LAN courseware for these five sites at no cost to the project.

C. PROGRAM PLAN AND TARGET POPULATION

The Shakopee Technology Demonstration Project expands an existing program that combined a local area network (LAN) with full year scope and sequence math courses for the microcomputer. The project plan was to expand the hard disk LAN from the secondary level to two previously unserved populations: elementary and post-secondary. The target population for the program is all 2000 K-12 students in the Shakopee schools, as well as students at the Carver-Scott Co-op and the Minnesota Correctional Institution for Women.

The mathematics courses using the microcomputer are organized by instructional objectives. Textual components, coordinated drill and practice exercises, and worksheets that test item and objective analysis are also included. The networking system not only assists the teacher in presenting concepts, but keeps track of students' progress with an automatic record-keeping - management system to monitor student achievement.

Serving three different elementary schools was planned to demonstrate the feasibility of computer networking in three distinct building types. Central Elementary is an older, multi-story building. Sweeney Elementary is a newer, single-story, traditional closed classroom building and Pearson Elementary is a new single-story open facility.

The post-secondary component of the expansion was planned to serve adults in three vocational programs of the Carver-Scott Cooperative Learning Center. Students from Shakopee, Chaska, Jordan, and Waconia School Districts, enrolled in the GED, Adult Education for Retraining, and pregnant teenage women in the New Beginnings program would use the system. It was also proposed that the system would serve inmates of the Minnesota Correctional Institution for Women at Shakopee.

D. POTENTIAL BENEFICIARIES

The primary beneficiaries of the program were to be the 2,000 participating students. Specifically targeted to benefit were high- potential students who would be allowed to work at their own pace, homebound students who would participate using home-delivered floppy disks, and absentee students through an individualized method of making up missed work.

The system is seen by the district as one way of helping teachers cope with increased class size. It was planned that the multi-user system would benefit teachers whose time, freed from the burden of disk management, would be more available for instruction. The program would also benefit teachers who would become computer literate through in-service training. Math teachers were particularly expected to benefit from the use of the math courseware and management materials.

IV. PROGRAM IMPLEMENTATION

The Shakopee Technology Demonstration Project began the first full year of implementation of the technology site activities in September 1984. The following section describes the implementation in the various program locations.

A. ELEMENTARY SCHOOLS

Three elementary schools are using Corvus 45 megabyte hard disk networking systems in their computer laboratories this year. Each lab has 14 Apple IIe stations linked together to enable classes to work simultaneously on the same activity. Teachers have received in-service in Format II word processing, EZ Pilot programming, QA&V authoring, Grade Manager, and software review. Special in-service assistance was provided to the sixth grade teachers implementing the LAN computer math program for the first time this year. The computer lab in each elementary is available for all staff and students to use. Other computers are located in the special education department and the teachers' lounge. A catalog of software for local area networking in the Shakopee elementary schools was developed this fall to help K-6 teachers choose appropriate supplementary materials.

Approximately 142 sixth grade students are using the math courseware, along with their math textbook, for the first time this year. Shakopee schools and Ideal Learning have conducted training to help the 6th grade teachers learn to use the courseware and management/record-keeping system and correlate the objectives to their curriculum. Teachers have adapted the system to their individual teaching styles. Some teach a math concept the first half hour and then follow-up with drill and practice on the computer, others alternate days between classroom instruction and computer use. Team teachers divide their classes into two math groups and rotate twenty minutes of instruction, 20 minutes of assignments, and 20 minutes of computer time for each group every other day. The teachers say that 75% of their 6th grade students can use the system independently, 20% need help now and then, and 5% need assistance to use the program effectively. They agree that the system works best for accelerated students, can help absentee students make up missed assignments, and can help slower students if they have individual attention.

B. JUNIOR HIGH SCHOOL

Students in junior high participate in full year math courses by objectives in a sequential curriculum. Approximately 67 seventh graders, 64 eighth graders, and 113 ninth graders use the 30 Apple IIe stations in the computer lab for their math program. The junior high principal estimates that 45-50% of all junior high students have math or computer programming in the computer lab. Students in the accelerated and above average math classes use the LAN system; students in the other math classes receive regular classroom instruction without the computer.

The students in the LAN computer math classes alternate between classroom instruction and computer lab time. One day the class meets with the teacher for regular instruction, the next day the students work in the computer lab with the teacher present for supervision of assignments, reviews, and testing. No student textbook is used in the computerized classes as the

students take notes from the reinforcement section of the program. The math faculty use the computer lab extensively. Occasionally a life science class uses the lab. A computer literacy - programming class is scheduled for this winter. The junior high also developed a new computer literacy curriculum.

C. SENIOR HIGH SCHOOL

In the senior high, advanced math students participate in computerized courses in advanced algebra and calculus. Students also have exposure to computer technology in word processing classes and home economics. The senior high school has one instructional computer lab with 13 Apple IIe stations networked to a 20 megabyte Corvus hard disk. Another computer networking system is devoted to administrative and word processing functions. The senior high was the first school to successfully network the Minnesota Career Information System in a computer lab this fall.

As in the junior high, the above average students participate in the computer class option; most students of average or lower ability remain in traditional math classes without computers because the district found these students did not have the motivation to remain on task with the computer program. The math teachers meet with their students daily in the computer lab where one-half of the period is teacher lecture and the other half is devoted to drill and practice assignments, review, or testing. In the computer section, the students first read a short summary of the teacher's lecture and write down definitions and examples for reinforcement. No student text is used. Drill is next with about 10-20 problems for the students to solve, then worksheet assignments are given to the students. The teachers report that computer instruction is equivalent to their regular instruction and that they are comfortable with the math software. Students' reactions are more varied; girls say they get more out of the teachers' instruction, while boys say they enjoy the opportunity to learn individually on the computer courseware.

D. CARVER-SCOTT COOPERATIVE LEARNING CENTER

The Cooperative Learning Center is an alternative school providing vocational and G.E.D. programming for high school dropouts and post- secondary students in Shakopee, Chaska, Jordan, and Waconia. A Corvus LAN and five microcomputers are installed at the Center. This fall the system is used by the Model Business Office program in the vocational school to aid instruction and provide practical experience with accounting and word processing. James Hinck, the Co-op administrator, plans to use the networking capabilities and the math courseware with the high school diploma program later this year. He sees the technology as broadening the base of education at a reasonable cost, while providing more capability in a more convenient configuration than a stand alone microcomputer.

E. MINNESOTA CORRECTIONAL INSTITUTION FOR WOMEN

The Womens' Correctional Institution installed one 20 megabyte LAN in late October for computer assisted instruction. The system and courseware will be used with two Apple IIe microcomputers currently available and two more on order. Roger Knudson, Education Director, uses the system on an individual basis with six people enrolled in the G.E.D. program and four women learning typing. Instruction in math, spelling, and computer literacy are the planned uses of the system.

V. PROGRAM OUTCOMES

The success of implementation at the Shakopee Technology site is the demonstration of the applications of local area networking with microcomputers in a variety of educational institutions. Benefits to the school district include the ability to offer new courses, e.g., calculus, without adding new staff, and helping teachers to manage classroom instruction scoring and reporting. Adaptation of the LAN system to other sites is a potential positive outcome as shown by the interest expressed from over 200 visitors from other school districts during visits to the Shakopee demonstration site in the past ten months. The math courseware used on the network is designed for individualized, self-paced instruction. It may be most appropriate for very small schools which would not be able to offer advanced math classes without the aid of a computer program.

Progress has been made, but it is too early in the school year to indicate the level of accomplishment. Teachers report that the management system is time-consuming to use, but additional in-service training in this area might increase the useability of this component. Teachers have tried two different approaches to instruction using the mathematics LAN courseware: 1) alternating days of classroom teacher instruction with a teacher-aide in the computer lab, and 2) the back to back approach where the teacher and the class are together in the classroom and the computer lab on alternate days. This back to back approach seems to receive more teacher support for the continuity it offers the students. At the same time, when teacher time is necessary in the lab because aides do not provide the necessary instructional support, this may not be cost-effective for the district.

The outcome of using the program with absentee students is very positive. Students can read the math reinforcement program on the computer and then begin to make up the assignments missed. This same process is possible with homebound students, but the district doesn't have anybody homebound at this time. The courseware also offers a highly individualized method of math review for students at the beginning of the year. Another district objective, teaching keyboarding instruction to all elementary students, is ongoing throughout the school year. A new computer literacy curriculum guide was compiled and will be taught in the junior high this year.

Teachers using the LAN and math courseware have also reported some negative outcomes. The courseware is not entirely self-paced and some screens go by too quickly for slow readers to comprehend. Students are presented with math problems on the computer screen to solve by hand and then enter the answer into the computer. Math problems are solved from right to left, but then the answers are entered in the computer from left to right; this causes difficulty for some children. Some teachers have concerns that they are asked to teach a math course using computer courseware which they understand was not pilot tested to check its benefits to students. Several teachers and parents stated that they feel "computers are more than just math" and they would like to "see other subject areas scheduled in the computer labs."

The individual teachers using the math courseware set different levels for student mastery of objectives. Mastery levels vary from 70%-90% mastery before students can move on to the next math objective. Teachers are concerned what impact these differing standards may have for student achievement.

Teachers say they need more microcomputers because the courseware was developed for individualized instruction, yet they only have 14 computer stations available for 27-30 students per class.

The project's longevity in the district seems assured by the superintendent and the school board. The LAN system and networking courseware will be maintained in the district and expanded to new grade levels and new content areas as time and funding permit.

VI. SUMMARY

The Shakopee Technology Demonstration Project is demonstrating new solutions to the many problems confronting small school districts: reduced operating funds and cutbacks in personnel and course offerings, especially in specialized areas. Project staff intend to use local area networking (LAN) to offer otherwise unavailable classes for students, efficient management for teachers, and access to computer laboratories for instruction. Teacher in-service in computer awareness and literacy is also an important aspect of the project.

Computer instruction has become a regular feature in Shakopee math classrooms. The successful use of computers to augment instruction requires that teachers learn new skills. Specifically, educators are seeking help in identifying software which can best meet their needs.

The problem of limited educational software available for local area networking systems is an issue of concern. It was this same issue which led the school system into an agreement with Ideal Learning, which allows teachers to develop mathematics courseware for the LAN. Questions have been raised by some of the district's staff. Is the courseware an appropriate or exemplary use of computer technology? Should pilot testing of the courseware be done to evaluate its usefulness and effectiveness for teachers and students? Could higher level thinking skills be incorporated into the curriculum courseware? These issues may be worthy of further study to determine their value and relationship in verifying the outcomes of the project.

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NORTHWEST EDUCATIONAL COOPERATIVE SERVICE UNIT
PROJECT SMART
CASE STUDY

I. INTRODUCTION

The SMART project (Subject Matter Awareness-implementation of Resources through Technology) is a cooperative effort of Northwest Educational Cooperative Service Unit which serves as the fiscal agent and houses the project coordinator, and 16 area school districts: Alvarado, Bagley, Erskine, Fertile, Fosston, Gonvick, Goodridge, Grygla, Hendrum, Humbolt, Kelliher, Landcaster, Middle River, South Koochiching, Strandquist, and Warren. It is a developmental project focusing on the technology inservice needs of small school districts. The processes and materials developed in this effort will be available to similar districts.

These districts recognized that technology in many forms is impacting educational practices and may offer unique opportunities to the small, remote, rural school district. The group who met to develop the Technology Demonstration Site grant proposal considered the issues and alternatives and proposed to develop a process and to demonstrate that small, rural districts can:

1. Optimize the utilization of technological materials and equipment already available in the cooperation member districts and,
2. Expand within each school district the use of technological resources through cooperation among member districts.

The project focuses on microcomputers, educational software, video production and its use, and low technology (i.e., overhead, film projectors, and tape recorders).

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICTS

The project districts are very small districts in terms of staff and student population, averaging 385 students. Eleven districts have less than 300 students, four greater than 500 and one at the average of 385. Geographically the 16 districts are located in all directions from the ECSU office which is in Thief River Falls. The districts average 50 miles driving distance from the NWECSU office.

The project schools are very small, remotely located, facing enrollment declines and having in most cases very restricted budgets. Necessarily these schools must maintain the basic functions and procedures expected of a school district. The personnel in these districts are very busy people having multiple committments and responsibilities. It is difficult to free staff members to take on additional projects and tasks.

The project authors were aware of the impact of technology on society and the need to prepare students in a technological world. They also were aware of discussions about the potential of technology to assist in providing broader educational opportunities to students in small rural schools. They expressed concern that efforts to incorporate high technology would result in expenditures for equipment and material that like the previous low tech-

nology would not be fully utilized in their programs. They therefore proposed to first inventory the educational technological equipment and software that already was present in the districts and to increase its utilization through a cooperative inservice program. Second they proposed to expand through cooperative inservice training, the use of technological resources within each school, focusing on microcomputers, educational software, video production, and teacher utilities through the identification, development, and services of a cadre of teacher specialists from the participating schools. They believed it important that the goals be supported by a local resource staff rather than a visiting staff.

The project decided that subject specialist should be identified and trained in the following teaching areas:

Teaching Areas	Grade Levels
Art	K-12
Business	7-12
Career Ed/Counseling	7-12
Elementary	K-2
Elementary	3-4
Elementary	5-6
English	7-12
Foreign Language	7-12
Home Economics	7-12
Industrial Arts	7-12
Media	K-12
Mathematics	7-12
Music	7-12
Science	7-12
Social Science	7-12
Special Education	K-12

Identification of teachers from among the staff members of the participating member schools who had sufficient background and the willingness to serve as a subject specialist was an important task for the project.

III. PROGRAM IMPLEMENTATION

Within the districts there are staff members who for many reasons have developed knowledge and skill with technology. The purpose of this project is to increase the level of awareness and utilization of educational technology among all the teachers by developing teacher specialists within the districts who assist their local schools with technology in general and also assist all project schools with technology in their specialty field.

The teachers who were named as subject area specialists participated in a week long training/planning workshop in August. During this workshop the project provided sessions on: Computer Literacy/What Is It?, Utilizing "Low Tech" Effectively, Word Processing, Overview of Computers in Subject Areas, Utilizing Computers is the Classroom, Video Tape Production and Use in the Classroom, Teleconferencing, Interactive Video, Satellites and Earth Stations in Education, Robotics, and Preparing for the Future.

Effort was also directed to designing an inservice effort to be conducted at the specialist's home district as the initial phase of the inservice effort.

The local inservice focused on:

Computer Literacy
Word Processing
Grade Management
Teacher Utilities
Video Taping/Using
Low Technology Utilization

Material aids for these inservice topics have been pulled together by the project. The schedule for subject matter area inservice was delayed until the teachers had been inserviced on the above listed general topics. During this period the subject specialists and the project staff developed listings of resources to support the subject field effort.

The staff development program is conducted during inservice days included in the district schedule and during other sessions agreed to by the faculties. The basic plan called for three inservice days devoted to technology in general and additional days for subject field inservice. Because of the relatively short project timeline, inservice calendars were not uniform among all the districts.

The participating districts have made financial committments to this project. To fully fund the proposed project budget of $188,475, each district contributed $9.78 per pupil enrollment for a total of $60,632. Selected expenses to the districts due to the project such as substitute pay and mileage are charged back to the project up to the amount of the above assessment. The districts are also responsible for five days release time for their staff to attend inservice sessions, and to purchase the equipment and software utilized by their staff. The project budget funds the subject matter specialist activities including payment for their substitute, stipend, travel, and materials. The NWECSU is serving as fiscal agent for the project and contributed to the local support of the project. The superintendents of the participating districts serve as an advisory committee to the project.

IV. PROGRAM PROCESSES

An indepth, week long training/planning workshop was held in August with the teachers identified as teacher specialists participating. The agenda was selected to provide a broadly based background in technology in education for the teacher specialists (see program inputs). The same group also attended MECC 1984 together in support of their role as trainers. This group is conducting training for all interested staff in word processing, grade management, video taping, teacher utilities, and using low technology, in their home district. In addition to the training, they will assist teachers as needed as implementation of technology takes place. They also will conduct area subject matter oriented training sessions were designed to be group activities, but using a hands on approach.

The project SMART inservice activities were kicked-off on September 17 with a common inservice day for the staff of all of the cooperating districts. The agenda included a description of the project, a filmed presentation on the cultural implications of the information and technological explosion, a presentation on technology and the school curriculum and on instructional television, and subject matter area group discussions.

The project director schedules project wide inservice functions from the NWECSU office to coordinate among the district administrations. Local inservice times are scheduled by the teacher specialist in consultation with the local school administration and teacher groups.

The districts each conducted an inventory of equipment and software that existed in the districts to identify what was available to be enhanced through the project. The project also developed a Technological Self-Assessment instrument for use by individual teachers, and a Computer Literacy Quiz to assess the level of development of the staff.

V. PROJECT OUTCOMES

The teachers from the cooperating school districts were introduced to project SMART at the September common inservice day. Some concern was expressed following the initial activities during which a film was used to present concepts about the impact of technology and the information explosion on our culture. The remainder of the day was well accepted. The concern seemed to be a mix of the requirement to attend and the style and form of presentation rather than with the content considered.

The project has established a group of 18 teacher specialists from the 16 cooperating school districts (there are three English 7-12 specialists) who attended a week long training/planning session during August and the MECC 1984 conference in November to prepare themselves to assist the project area teachers in the utilization of technology in education. These specialists are conducting inservice sessions for their local school faculty in the following topics: computer literacy, grade management, teacher utilities software, word processing, video taping, and low technology.

Twelve districts have completed the basic computer literacy sessions with their staff. Grade management has been done in eleven districts. Eight have demonstrated word processing applications, while six have conducted sessions on video taping. Three have experienced the teacher utilities software packages and the same number have conducted a refresher on the uses of low technology materials and equipment. One district attempted a session on robotics. Approximately 50 percent of the scheduled within district inservice activities are completed at this time.

A series of interdistrict sessions organized around subject matter field has been scheduled and will begin in January. The subject specialist are accepting the challenge but in many cases were feeling a little inadequately prepared at the time of the MECC conference and before they had experienced that program.

During a November meeting of the teacher specialists with the project director the specialists discussed problems they were experiencing in conducting and completing the inserviced sessions. A major item was the resistance to change being expressed by staff members when they were being asked to consider technology in their program. Six of the specialists reported that over 50 percent of their co-workers were resisting the need for the training being conducted (these reactions may be representative of many faculties in many regions). In several districts it was reported that inservice sessions were hampered because of the lack of sufficient computer equipment to service the staff. One district has had a very long delay because of delays in delivery of computer equipment. Inservice sessions in this region are further hampered by a lack of substitute teachers to release staff for training.

Another major item and perhaps related to the first, was the lack of time during which to conduct the amount of inservice being proposed. Several factors contribute to this problem. One is the small number of inservice days present in the master calendars, and the need to utilize noncontracted time for inservice. A second factor is the very busy schedules maintained by rural teachers. Even with the large push being given to technology in education, in most districts it is not the highest priority concern of the staff in terms of maintaining the school program.

Two strategies to enhance involvement in inservice sessions were reported. One involved the use of a rotating substitute teacher to release teachers for one hour to attend word processing training, the second involved offering the training sessions in conjunction with a university so that the teacher would receive credit for the training. All agreed that the training sessions were basic but, unless follow through implementation occurred quickly in terms of the teacher becoming involved with the material presented, the chances of impacting the school program were slight.

The project director has established an openended manual of materials to support the subject specialist in their training session with their groups. The inservice manual includes: the Demonstration Site Project Equipment Inventory, the Technological Self-Assessment, the Computer Literacy Quiz, the Project SMART Technology Skills Inventory, a Computer Literacy Unit, the Computer Literacy Checklists, and Audio-Visual Unit, the Low Technology Checklist, a listing of Project Resource People and film resources, and the project SMART Plan which includes the targeted completion dates for various inservice topics. This manual should be of value to similar districts that are attempting to inservice their staff regarding technology in the schools.

The project staff designed equipment inventory was completed by each of the project districts. The results have been tallied and are utilized in the low technology inservice sessions. A Technological Self-Assessment was completed by each teacher and utilized by the specialists in designing the inservice sessions. The Computer Literacy Checklist is being completed as the inservice is completed.

Because this project is a developmental project it is not yet ready to demonstrate applications of technology in the school setting to visitors.

VI. SUMMARY

The project at this writing has established an ambitious schedule of activities directed toward demonstrating that school districts can implement technology into the schools utilizing their own and shared resource staff and materials.

The project has identified and trained 18 teachers from 16 cooperating districts to function as content area specialists in technology. They are responsible for conducting technology inservice sessions for their home district and project wide inservice in their content area. Approximately 50 percent of the basic inservice is completed. The subject matter oriented inservice will begin in January 1985. The project has assisted the local districts in an inventory of technology that already existed in the districts. A Technological Self-Assessment instrument has been developed for teachers to estimate their skills.

Several nagging problems have made inservice planning and delivery difficult. In several districts it was reported that inservice sessions were hampered because of the lack of sufficient computer equipment to service the staff. One district has had a very long delay because of delays in delivery of computer equipment. Inservice sessions in this region are further hampered by a lack of substitute teachers to release staff for training. Large group sessions are difficult because of the lack of a sufficiently large meeting space or dining space in the districts.

Although a mobile technology laboratory was considered for this project and rejected on the basis of cost such a concept should be considered again. A lab such as the INTECH mobile lab seems to be a way to deal with some of the problems of assisting remote, rural schools to keep up with the changing world of educational technology. Consideration should also be given to developing inservice modes or components that are self-instructional and not expert dependent. Technology should offer some solutions.

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ROBBINSDALE TECHNOLOGY DEMONSTRATION PROJECT

CASE STUDY

I. INTRODUCTION

The Robbinsdale Technology Learning Campus Project was designed as a magnet alternative program for sixth, seventh, and eighth grade students. The Technology Learning Campus (TLC) intends to emphasize the integration of technology in the curriculum and as an integral part of the daily teaching and learning process.

The project was planned to remedy a perceived lack of substantive alternative programming in grades 6, 7 and 8 in the district. A magnet program with a technology focus seemed to answer the district's goals of developing an innovative alternative program, acquiring more computer equipment, beginning teacher in-service, and bringing technology education to all populations in the district.

This site is clearly a "start-up" project. It is essentially a brand new alternative school which uses technology both as a learning tool and as a delivery system. As a new school, it has had some success but has also encountered probably very typical problems. Additional time will be required for TLC to demonstrate its outcomes - both positive and negative.

II. PROJECT CONTEXT

A. DESCRIPTION OF DISTRICT

The Robbinsdale Area School District 281 is a suburban school system serving approximately 85,000 residents. The district includes the Twin Cities northwest suburbs of Robbinsdale, New Hope, and Crystal, and parts of Golden Valley, Plymouth, Brooklyn Center, and Brooklyn Park. The school district serves an enrollment of 14,500 students in 2 senior highs, 3 junior highs, 11 elementary schools, and the Technology Learning Campus. The school board employed the current superintendent, Dr. Donna Carter, in 1983. The district's administrative leadership is committed to improving educational practice by challenging staff with change issues, developing integrated technology and education curriculum, and testing new teaching patterns. Teachers are pragmatic professional educators, most with 15-25 years experience, but with limited exposure to alternative education.

B. NEED

Typically, there are many issues involved in the decision to close a high school and many needs that result from the closing. The closing of Robbinsdale High School in 1982 caused a split in the district due to the absence of school buildings on the east side of the community. The need to "mend fences" and restore an educational programming site was a prime factor in the decision to locate the new Technology Learning Campus Project on the community's east side. Other influences in the process of identifying educational needs were:

1. The superintendent's desire for a magnet alternative program to draw support from all areas of the district,

2. The computer/math/media departments' interest in testing a variety of educational technology applications with a small student sample before implementing the best uses throughout the district,

3. The school board's interest in using a vacant school building for multi-purpose programming for students, parents, and senior citizens.

A technology planning committee appointed by the superintendent reviewed the Educational Technology Act and decided to apply for a demonstration site project based on the district's history of technology use and the needs described above. This group brainstormed several options which would meet these needs. The final decision to initiate a new technology school was the most ambitious, yet the committee felt it offered the most promising strategy for meeting the needs of the district and facilitating the changes technology brings to the educational process.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

The Robbinsdale area schools began instruction on the use of computers in the late 1960's. During the early 1970's, the district purchased time sharing services first from industry, and later from MECC. The first microcomputer programs and activities were initiated in 1978. At that time, several Commodore PET microcomputers were purchased for use in classrooms throughout the district. Teachers and students were enthusiastic about the potential of the computer for instruction. The district implemented a Microcomputers in Education Project, funded by Title IV-C, to develop and test computer-assisted instructional programs. This project produced 175 instructional computer programs for reading, math, spelling, music, foreign language, science, and social studies between 1979 and 1982. These programs have received extensive use in the district and have also been distributed nationally.

In October 1982, the district appointed a 35 member Futures Committee representing staff and community to develop a plan for the future of education in Robbinsdale. The Committee produced a mission statement entitled, "A Commitment to Excellence", in August 1983 which states "accelerating technology is a major element in the learning process, both as a dynamic force for change and as an enabler of change," The Technology Learning Campus is a tangible outgrowth of this philosophy.

During 1983-84, forty percent of the district teachers and administrators participated in an in-service program on computer literacy. Four staff, now with TLC, participated in a project jointly sponsored by 3M and the district designed to acquaint them with the industrial applications of technology. Other technologies used in the district include video, audio, and cable television.

As of fall 1984, all elementary schools in the district house a computer laboratory. The three junior highs installed computer labs in 1983 to support instruction and computer literacy. The senior high schools offer elective courses in computer science and programming, as well as accounting and word processing classes. Media centers in several of the schools also provide student access to microcomputers.

D. PROGRAM GOALS

The anticipated outcome of the project is the implementation of a Technology Learning Campus for 300 students in grades 6, 7, and 8, and 75 adult residents by September, 1984. The specific objectives are:

1. To establish commitment for funding of the Technology Learning Campus by June 1984.
2. To secure a physical plant for housing the Technology Learning Campus by September 1, 1984.
3. To serve the entire community by providing a retraining center and other educational services through community and vocational education partnerships by September, 1984.
4. To appoint a site-management council composed of parents, students, teachers, community residents, and business leaders which will begin functioning June 1984.
5. To employ the TLC staff by June 1984.
6. To write a TLC curriculum that will integrate technology and technological processes with other learning systems by September 1984.
7. To enroll 300 students in grades 6, 7, and 8, and 75 adults by September 1, 1984.
8. To begin in-service training for staff to strengthen their teaching strategies and classroom management procedures with technological tools by January 1985.
9. To disseminate program model information and curriculum software on request to districts by July 1985.

III. PROGRAM PLAN

A. STAFFING

The Technology Learning Campus is managed by Project Director, Barbara Nemer, who works closely with the superintendent's office and the assistant to the superintendent, Linda Powell. The principal is Lyle Mottinger, who is also principal of Hosterman Junior High School. Mottinger and Powell often spend 2 half-days per week with TLC assisting with organizational development and administrative concerns. Administrative Intern, George Lillquist, serves a dual role of assistant principal and teacher.

The TLC professional full-time equivalency (FTE) staff is 11.6. This includes ten full-time teachers, a .4 math teacher, a .4 reading teacher, a .2 art teacher, and three foreign language teachers (French, Spanish, and German) who share a .6 position. Three part-time aides assist students in the computer labs or classrooms. Five music instructors who teach band, choir, general music, and orchestra are also involved with TLC. A social worker and psychologist each spend one day a week at TLC. The demonstration project has a full-time secretary. All Robbinsdale teachers had an opportunity to apply for transfer to the Technology Learning Campus; six teachers were hired during this process in March 1983. Approximately half of the teachers have some skills using technology in the classroom. Other teachers do not have technology training, but are interested in the concept of technology aided education. Differentiated staffing at TLC allows teachers to offer instruction in areas other than their speciality, e.g., a special education teacher might teach a telecommunications class.

B. FINANCIAL SUPPORT

The major source of support for the Technology Learning Campus is provided by the Robbinsdale school district. The district general fund supports the staff, capital outlay, transportation, elementary and secondary curriculum. Block grant funds may be used for equipment. The technology demonstration funds are used largely for salaries. The remainder of the $960,000 budget will come from the district. Additional sources of funding may be sought from foundations and the private sector. Honeywell has contributed $10,500 for the purchase of robotics equipment.

The Northwest Area Foundation awarded TLC a $10,000 grant to establish a school based management program. An eleven member site management council consists of parents, staff, and students who meet monthly to guide planning for the Technology Demonstration Site Project. The goal of the site management council is to achieve a dynamic learning environment to meet the needs of students and community.

C. PROGRAM PLAN, TARGET POPULATION, AND BENEFICIARIES

The program plan for the Robbinsdale Technology Demonstration Project is to develop a new school, the Technology Learning Campus, as a magnet alternative program for 6th, 7th, and 8th grade students, and a learning/retraining center for adults. Technology is the planned focus of the curriculum and will be integrated into the daily process of teaching and learning. Robbinsdale staff, students, and community plan to work together to develop an integrated technology curriculum.

A major component of the Technology Learning Campus will be the community center for adults which will provide education or retraining in preparation for high technology careers. This inter-generational approach to learning may provide opportunities for enhancing the education process. Another planned TLC component is to serve as an in-service technology training/resource center for the local school district, as well as providing in-service information on a state and national basis. The overall goal of the Technology Learning Learning Campus is to reorganize the educational process, while adding a strong element of experimentation, in an effort to facilitate change.

The planned target population for the TLC project is 300 6th, 7th, and 8th grade students, and 75 adult residents of the community. Other beneficiaries will include the teachers at TLC who will benefit from the technology in-service opportunities which are being planned. The TLC project plans to work with the Volunteers In Action (VIA) program to establish a volunteer program for the school and to organize a volunteer program for students to help in the community. Over the scheduled three year implementation and development of the TLC, many other individuals, parents, Robbinsdale teachers, senior citizens, and other community residents might benefit from the project.

IV. PROGRAM IMPLEMENTATION

The Technology Learning Campus Project opened its doors to 300 students in grades six, seven, and eight on September 4, 1984. At the end of the first trimester, 292 students are enrolled; enrollment is 54% male and 46% female. The number of students in grade six is 110, grade seven is 108, and grade eight is 74. The Project Director interviewed 437 prospective students and their parents before selecting a balance of boys and girls, minorities, and special education students. Parents indicated that they wanted their children enrolled in TLC because they had felt the impact of technology in their own work and they thought technology would provide more individualized instruction for their children. Students from all achievement levels were selected for TLC. A lottery system was used to select the boys since they applied in greater numbers than the girls. The student-teacher ratio is approximately 26-1, versus 21-1 at the other junior high schools in the district.

The implementation of the TLC was slowed by a late start in preparing the physical plant, limited finances, and delays in delivery of microcomputer equipment. Two weeks prior to the opening of school, walls were being painted, desks and bookcases had not arrived, and the clocks didn't work. The TLC opened with one Commodore 64 computer lab with twenty microcomputer stations, disk drives, and two printers. The second computer lab of twenty Apple IIc microcomputers, disk drives, and one printer was ready by the end of the first week of school. The third instructional computer lab of fifteen IMB PCjr microcomputers arrived the third week of November. An electronic monitor displays daily messages for students and staff outside the TLC office. All students will learn word processing and keyboarding skills during a four week journal writing course in Humanities. During the fall, approximately one-third of the students received word processing and keyboarding instruction on the computers.

All students take courses in humanities (English and social studies), problem solving (math), healthy living styles (science and health), and telecommunications. A developmental skills class focuses on reading skills in grade six and recreational reading and study skills in grade seven and eight. These required courses are organized by grade levels, with the exceptions of humanities and telecommunications classes which are multi-age level. Students may also choose to take music, art, and/or foreign language classes. In addition, students are enrolled in two elective courses each trimester. Selections for the fall schedule included: keyboarding skills, ethnic folk arts and crafts of America, beginning or intermediate computer programming, physical education, spaceship earth, and creative dramatics.

The Technology Learning Campus is housed in the Robbinsdale Community Education Center where the district's adult education and senior citizen programs are based. In order to develop social responsibility and foster "a high touch as well as high tech program", students are encouraged to volunteer 15 hours during the year to help the community. The first student volunteer project took place on October 27, 1984, when 125 TLC students spent the day raking 60 lawns at the homes of senior citizens and disabled people. Future volunteer events are planned to help food shelves or shovel snow for the elderly.

In-service training of TLC staff has focused on curriculum writing and development within the four instructional teams: Humanities, Telecommunications, Math and Science. Other topics have included integration of curriculum, TLC philosophy, cooperative learning, curriculum planning, and a brainstorming session to focus on team building and philosophy. Teachers spent six weeks in June-July 1984 planning curriculum development in writing teams. Examination of the TLC Curriculum Guide in October 1984 indicated the following curriculum units had been prepared:

CURRICULUM AREA	UNIT TOPICS
Art	Photography
Electives	Creative Drama
Humanities	Word Processing, Poetry, Drama, Folktales, Foxfire, Touch Typing, Composition, and Global Education
Music	Band
Physical Education	Health Risks on Computer
Telecommunications	Drafting, Electronics, Telephone, Radio, TV, Satellites, Computers

The TLC Curriculum Guide did not indicate written curriculum units for Developmental Skills, Foreign Language, Health, Problem Solving/Math, and Science.

Teachers indicate they are very enthusiastic and supportive of TLC. Several of the staff are educational leaders in the district and are very positive about the opportunity to build something new in the educational process. At the same time, the teachers are overwhelmed with scheduling problems, equipment needs, large class sizes, and the need to develop and write new curriculum which incorporates technology utilization into the teaching and learning process. Many staff and administrators agree with the school board member who stated that "the TLC idea had good potential, but I believe we implemented it too fast. The staff was not given adequate time to prepare either themselves with the equipment they were to employ, nor time to prepare a program that could optimize the use of the technology equipment in their classrooms...hopefully, in time, the unique part of the project will be developed, but, so far, I don't think it is there." At least one parent is concerned about those courses which are multi-aged, particularly on behalf of minority students who may be inadequately prepared.

V. PROGRAM OUTCOMES

The major successes of the Technology Learning Campus in the first six months of funding are the desired opening of the new school, the generally favorable response by parents, and the student volunteerism program. Students have access to computers for enhancement of the curriculum in reading, math, science, word processing and programming. Evidence to support TLC's flexibility in the start-up process is demonstrated in the willingness of the district administration to revise the program schedule to better suit the needs of staff and students and to add two new staff positions for the second trimester to lower the student-teacher ratio.

Success is also reported in the support from community volunteers. The math and telecommunications teachers have used several parents and community resource people to aid in educational technology presentations which have been effective and well received by the students. The telecommunications instructors have videotaped some of the resource speakers for use with other classes.

The Technology Demonstration Project has met their objectives to fund the program, secure a physical school site, employ TLC staff, enroll 300 students and establish a site management council by November, 1984. The development and implementation of the rest of their objectives will be in process throughout the 1984-85 school year: write the TLC curriculum to integrate technology with learning, begin in-service training for staff, enroll 75 adults in retraining center, serve the community in retraining and educational services, and disseminate program information and curriculum software.

The need for a building principal, in addition to the project director, to support curriculum development and supervise the educational program delivery was perhaps unanticipated by the district and should receive more attention next year. The instructional curriculum objectives will be set by the end of the school year; no student outcome data will be available until spring 1985.

Another unanticipated issue relates to the implementation of the Technology Learning Campus program with students who are in grades 6, 7, and 8; this is not the normal junior high school population. The TLC staff previously taught in elementary, junior high, and senior high schools in the district. It has taken time for them to acquaint themselves with the "normal" expected achievement levels and behavior patterns of this new school age population. The staff also have concerns regarding appropriate discipline of students and this is an issue still to be resolved. Eight students have chosen to drop out of the program. No data are available, at this point, on the numbers of students who will re-enroll.

The issue of sex equity is recognized as an important factor in the focus on educational technology. Enrollment of students in grade six is balanced with 45% boys and 55% girls. Enrollment in grades seven and eight is 60% male and 40% female. Traditional male-female patterns begin to emerge in the students' enrollment in elective courses. The distribution of boys is higher in keyboarding and intermediate computer programming, while girls are more often enrolled in ethnic folk arts and creative dramatics.

ELECTIVE COURSE	GIRLS		BOYS		TOTAL	
	#	%	#	%	#	%
Keyboarding	19	32%	40	68%	59	100%
Beginning Programming	15	50%	15	50%	30	100%
Intermed. Programming	6	22%	21	78%	27	100%
Ethnic Folk Arts	42	72%	16	28%	58	100%
Creative Dramatics	38	64%	21	36%	59	100%

Other recognized outcomes of the early implementation of the Technology Learning Campus are the need for more flexibility and larger blocks of time for instruction with the younger students. The schedule for use of the two computer labs available during the fall trimester was very heavy. Several teachers expressed their desire to use the labs to supplement instruction, but the computer rooms were not available during their classtime. Perhaps the addition of the third computer lab will ease these staff concerns.

The Robbinsdale district is planning on developing the Technology Learning Campus over a three year period, although its survival will depend on its track record. The school system believes that it will be more cost effective and beneficial in the long run to devote energy and funds to the small scale TLC program rather than introducing one aspect of technology to all the schools.

VI. SYNTHESIS/SUMMARY

The Technology Learning Campus is an exceptionally complex model for change that attempts to serve as a vehicle for developing technological potential in 6th, 7th, and 8th grade students, for retraining a segment of the adult community, and for providing professional development for staff in a single program. It offers a variety of technology learning experiences, such as computer programming, word processing, and telecommunications.

The Robbinsdale Technology Demonstration Project has potential for success in the technological concepts it proposes for education. A strengthened curriculum, more qualitative outcomes, and a supportive developmental in-service training program would assist the project in achieving their goals.

It was the British philosopher, Carl Popper, who recognized that for each intended action, there are some unintended consequences. In a process model for change, such as the TLC, unintended and unexpected consequences are inevitable. Because the administration has chosen to let the participants shape much of the program's parts, the curriculum design has been left deliberately open-ended. Emerging issues and staff concerns tend to focus on project staff role definitions and perceptions of how well roles are being carried out. On the part of student and parent participants, concerns and issues relate to whether they are receiving the educational services they expected. Personality conflicts and differing perceptions of what are "normal" expections for 6th, 7th, and 8th grade students by teachers used to instructing elementary or senior high school students will take time to overcome. It is the nature of complex projects to stimulate feelings of uncertainty and dysfunction as participants struggle to establish personal roles and instructional patterns. As such, it is difficult to verify project outcomes and reasons for success or lack of success of the project.

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WOODLAND COOPERATIVE CENTER
COMMUNICASTING FOR EDUCATIONAL PURPOSES
CASE STUDY

I. INTRODUCTION

Communicasting for Educational Purposes is a four school-district consortium which is attempting to demonstrate two-way interactive television for instructional purposes. The project has been in operation since 1980, and has been funded by a variety of public and private sources.

The major issue emerging from the case study is whether this particular implementation of interactive telecommunications has been able to prove its efficacy as a cost-effective alternative method for providing instruction to students, and expanding curriculum alternatives.

II. PROJECT CONTEXT

A. DISTRICT DESCRIPTIONS

The four member districts are Eagle Bend, Bertha-Hewitt, Clarissa and Parkers Prairie. The Woodland Cooperative Center in Staples is the fiscal agent and administrative authority.

Located in Todd County, Eagle Bend has an enrollment of 380 students K-12. Eagle Bend is the control point for incoming and outgoing broadcast signals. Staff from this district initiated the project, directed it, and the district was the fiscal agent until this year.

Bertha-Hewitt has an enrollment of approximately 620 K-12 students; it is seven miles north of Eagle Bend. A high school classroom has been remodeled to serve as the television classroom/communicasting facility.

Clarissa is approximately six miles southeast of Eagle Bend. The district serves 350 students K-12. It has set aside a communicasting classroom in the high school area of the school facility.

Parkers Prairie is located in Otter Tail County, approximately 16 miles west of Eagle Bend. The district enrolls about 610 K-12 students. Parkers Prairie presently is set up only to receive broadcast signals, not to transmit.

The system employs two types of technologies: Low-power Ultra-High Frequency (UHF), and Instructional Television Fixed Service (ITFS). Classes and other programming originating from the primary site (Eagle Bend) are broadcast via UHF, which has a broadcast range of approximately 20 miles. The remote sites retrieve the signal just as a normal household television antenna with a UHF adaptor receives transmissions from a commercial facility. The remote sites transmit to Eagle Bend via ITFS, which is a line of sight microwave transmission specifically set aside for school use. Each site, with the exception of Parkers Prairie, has a broadcast tower, color monitors and other equipment necessary to both send and receive signals. Communication is instantaneous, meaning that students and teachers in outlying sites are able to see one another at all times. The system also has a satellite downlink, enabling retrieval and rebroadcast of a variety of informational programming.

B. NEEDS

The project is designed to address needs for upper level elective courses, particularly in such areas as foreign languages and advanced mathematics. System staff are hopeful the system will allow the participating districts to remain in compliance with recent Board of Education curriculum rules.

The process of needs identification has never been formal. Course offerings have been identified by the participating superintendents and principals, but no formal assessments have been conducted among community, teachers or students. The system and projected educational needs have been discussed in faculty meetings and at local Board of Education meetings. Formal operating decisions rest with a Joint Powers Board and with an informal Superintendent's Advisory Committee.

C. PREVIOUS HISTORY OF TECHNOLOGY UTILIZATION

As noted, this project has been in operation since 1980. The first experimental FCC (Federal Communications Commission) license was granted in February, 1980. During the operating history of this project, several hundred students have participated in classes; a number of teachers in the four districts have been involved in inservice opportunities and have taught classes via the communicasting system; and, many educators and others have had demonstrations of the project.

D. GOALS/ANTICIPATED OUTCOMES

The Demonstration Site proposal identified three primary goals:

- To demonstrate the successful operation of a low-power TV educational system;
- To disseminate knowledge about the project to other schools in Minnesota;
- To perform long-range planning and implementation for additional program enhancement.

The project also identified four instructional objectives: to provide expanded educational opportunities in the specific low-incidence courses of math, science and foreign language; to attend to the inservice needs of staff; to provide enhancements to the system to better meet the needs of students; and to measure the effectiveness of instruction over this system in comparison to on-site, traditional classroom or itinerant modes.

III. PROGRAM INPUTS

A. STAFFING/RESOURCES

The Communicasting project has a part-time director located at the Woodland Cooperative Center. A part-time Coordinator, a member of the Parkers Prairie faculty, works on scheduling and operations as well as providing a large part of the dissemination and demonstration efforts required by the grant. The studio operates with a full-time technician. A licensed engineer is on retainer a few hours per week to assure transmission quality and to handle minor equipment repairs. One Communicasting contact person in each district is being identified, to help with equipment and to facilitate interdistrict coordination. A number of students assist with camera work and other operations in the main studio.

Each school district has made a formal commitment to continue participation in the project during the 1984-85 school year, in the forms of both formal Boards of Education motions and administrative support. Additionally, each school district has contributed $5,000 to the project, as well as personnel and administrative costs.

B. FINANCIAL SUPPORT

The majority of the 1984-85 operating budget is derived from the Technology Demonstration Site grant. Additional funding is provided through a Bush Foundation grant to ECSUs 5 and 7 for teacher inservice in telecommunications.

C. PROGRAM PLAN

The components of the operating plan include increasing the number of students enrolled in courses, increasing the number of available courses, increasing community service programming, providing inservice for teachers, and demonstrations of the project. Ongoing planning for program expansion and enhancement is also part of the operational plan.

D. TARGET POPULATION

The Communicasting project has limited participation to students in grades 11 and 12. Others targeted for participation include teachers either directly involved in course offerings and/or those interested in the system, community members in the broadcast area, and educators from around the State interested in this particular implementation of telecommunications.

E. POTENTIAL BENEFICIARIES

This project could potentially serve all 900 secondary students in the four participating school districts; if participation continues to be limited to upper class students (grades 11 and 12) those numbers would be considerably smaller.

Given that the Communicasting system is available to all households within its broadcast range with UHF adaptors, nearly 5000 persons could be served, with community education classes or by the various entertainment and community-oriented programs offered.

Quite clearly, demonstration of this program to visitors and dissemination of information about it could potentially be valuable to the large number of school districts currently investigating the instructional applications of television.

IV. PROGRAM PROCESS

A. IMPLEMENTATION

The first instructional objective speaks to expanded educational opportunities in math, science and foreign languages. During the current school year, three classes are being offered: advanced math, business communications and notehand. The advanced math course originates from Bertha-Hewitt, Business Communications from Parkers Prairie and Notehand from Clarissa. A total of 39 students are enrolled. Twenty-six of the 39 (67%) students are enrolled in the school district from which the class originates. That is, 13

students are receiving interactive instruction in courses not offered in their home school district. It should be noted that an additional 36 students were registered for a German class this year, but the teacher resigned just prior to the start of school and no replacement has been found. A business law class is planned to follow the one-semester business communications course; 12 students are pre-registered, all from the origination site.

Over the five years this program has been offering courses, a total of 106 students from remote sites have been involved in seven courses not otherwise available. Remote site participation by year is: 1980-81 (5), 1981-82 (24), 1982-83 (36), 1983-84 (29), 1984-85 (13).

The second instructional objective incorporates staff inservice, assessment of student achievement and dissemination. During the summer of 1984, ten teachers from the participating districts were involved in a two-week inservice, supported by grant funds from the Bush Foundation. Teachers from other Demonstration Sites and other school districts were also involved. The program was planned and directed by a consultant. Additional training is planned for this coming summer, but plans are as yet unspecified. Student achievement assessment is informal consisting simply of teacher's grades for student performance in courses. Efforts at dissemination include twelve presentations on site since April, 1984. Efforts in securing other financial resources have been aimed at encouraging and soliciting other school districts to join this project, to look for other grant availability and to remain in touch with the legislative process in hopes of receiving a continuation of the Technology Demonstration Site grant.

The third instructional objective is related to enhancement of the Communicasting system. Basically, this is intended to provide for a transmitter and tower for Parkers Prairie during the current school year. Project staff are currently awaiting completion of an engineering study prerequisite to locating the tower and ordering the transmitter. Plans to involve other school districts, like Staples, have not been made.

The fourth operational objective speaks to measuring the effectiveness of this system in comparison to on-site, in-classroom and/or itinerant instruction. Limited activity is occurring in this area, in part because of the difficulties associated with comparative research, in part because of limited funds, and in part because staff do not possess significant evaluation/research expertise. Teachers and principals are attempting to track students' grades in remote site communicasting classes, for comparisons of grades of students in the same class from the host site.

The three overall goals, as noted, deal with 1) demonstration 2) dissemination packages and 3) long-range planning. With respect to these objectives, there have been twelve demonstrations to various groups since April, 1984. At least nine presentations away from the site have been conducted during the fall. Each group was comprised of approximately 8-10 persons, for a total dissemination effort to about 80 persons. Dissemination materials have been developed and include a mimeographed four-page pamphlet describing the project and a small booklet which answers frequently asked questions and provides some background facts about the project. With respect to the long-range planning goal, some preliminary discussions have occurred among limited groups of administrators and the coordinator.

B. DISCREPANCIES FROM PLAN

While few persons interviewed by the evaluator believe there are any discrepancies from the proposed operating plan, it seems clear there are a number, particularly in those areas described as instructional or operational objectives. Those interviewed believe the only discrepancies which have occurred are related to a continued lack of communication with teachers, and to the immediate problem with the Parkers Prairie expansion.

Overall, the primary effort has been in the area of demonstration/dissemination. Little systematic formal activity in the area of long-range system planning has occurred.

Regarding the four instructional components, there is little evidence of significant progress. There are fewer courses being offered on the system now than were offered in 1981-82. There are fewer students served than there were in 1981-82. Moreover, only one of the courses presently offered is in a priority area of math, science or foreign language. This is due, in part, to the inability to replace a foreign language teacher who resigned just before school began in the fall. It may also be due to continuing communications problems with teachers.

There have been efforts made in the area of teacher inservice, although these inservice activities were not entirely due to the efforts of Communicasting staff. This two-week session was planned, organized and delivered by a consultant to ECSUs 5 and 7, via a grant from the Bush Foundation. It does not appear that significant efforts beyond the Bush grant program have been made.

There is limited formal student assessment, beyond normal grading procedures. However, teachers, students and administrators believe that instructional quality is good and that students perform as well as or better than they do in "regular" classes. Participating teachers and students express mostly positive comments about the learning provided by the interactive network.

Overall, the primary efforts to date have been in dissemination/demonstration. Long-range system planning has been largely delegated to the project coordinator. His efforts have been in building schedule coordination among the participating schools, building student interest in interactive classes and attempting to build (rebuild) communication bridges between teachers and administrators.

C. INTER-DISTRICT COOPERATION

Administrators in the four districts and Woodland Cooperative staff describe cooperation among the districts as good. They indicate that the hiring of a project coordinator has greatly facilitated information exchange and communication. Needs are apparent for cooperative financial planning, curriculum and course development and scheduling. All administrators mention the interdependency of schools in this consortium and the necessity for cooperation if the project is to continue.

V. OUTCOMES

An interesting and perplexing set of conclusions can be drawn about the Communicasting project. All administrators and virtually all participating staff believe the project has been successful, that interactive teaching to remote sites is both cost-effective and instructionally effective, that the program has enabled significant improvements in curriculum in the four school districts and that the project will be continued. They believe, moreover, that the Communicasting project has much that can be demonstrated to educators from other locations.

A number of quite positive outcomes can be documented over the life of this project. Student technicians have gone on to employment in the communications field; some courses have been added and students have had access to options which would not otherwise have been available to them. Teachers' judgments suggest that students learn about as well with this technology as they do in a more traditional setting. Many administrators believe the project is financially justifiable and enhances the districts' ability to meet state-mandated curriculum requirements. Virtually all respondents indicate that the project coordinator has been a very positive addition to the project and has worked very hard towards improving communication between schools and among teachers and administrative staff.

With respect to objectives accomplishment, however, a different set of conclusions emerges. The picture for the project's four instructional objectives is as follows: expansion of low-incidence course offerings and widespread student service has basically not occurred; fewer students are being served and fewer courses being offered than in 1982-83; some effort has been made in teacher inservice in conjunction with the ECSU 5 and 7 Bush Foundation grant, however, no formal on-site inservice activities have occurred; there has been no formal, systematic student assessment or comparative analyses of this telecommunications alternative; the process of upgrading Parkers Prairie to become fully two-way operational is underway, but is as yet incomplete.

Some effort has been expended in dissemination/demonstration. Materials have been developed for that purpose and approximately 80 persons have received information about the project either on or off-site. Preliminary discussions about system expansion have also occurred, but no additional sites have been added.

It appears that the financial commitment to the project required in the absence of grant funds places strain on at least some of the participating districts. Moreover, staff continue to have concerns about the system and student interest is sometimes characterized as diminishing. Teachers continue to find that the mechanics of such things as the movement of papers from site to site to be troubling.

These findings raise substantial questions about the documentable viability of this project. Substantial efforts toward system expansion and student service would have to occur for this project to be described as successful.

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TECHNOLOGY REPORT

PART A

SECTIONS 11, 12, 13, 14, 15, 17, 18, 19, and 20

ARTICLE 8 - TECHNOLOGY

SECTION 11 [ADVISORY COMMITTEE ON TECHNOLOGY IN EDUCATION]

Requirement

By July 1, 1983, a 15-member advisory committee on Technology in Education shall be appointed by the governor to assist in the implementation of Sections 13-20 of this article. (See attached)

Status

Committee was appointed in July of 1983 and fully met all requirements of membership noted in law. Membership of the advisory committee has been very stable and attendance has been exceptional.

Comments

Committee has been an extremely hard working group. It has met on 16 occasions and has: 1) developed criteria and procedures for the evaluation of courseware; 2) developed criteria for selection of Technology Demonstration sites; 3) read and ranked 50 proposals submitted by Minnesota school districts; 4) discussed and gave advice on a variety of policy issues; 5) worked on an evaluation design for demonstration sites; and 6) supervised evaluation of demonstration sites.

SECTION 12 (129B.11) [DEFINITIONS] reporting is not applicable to this section

SECTION 13 (129B.12) [TECHNOLOGY UTILIZATION PLANS]

SUBDIVISION 1 [Development of Plan]

Requirement

Each school district is encouraged to develop and adopt, as part of its educational policy, a written technology utilization plan in consultation with the Planning, Evaluating and Reporting Law (PER) Committee.

Status

As of January 1, 1985, ninety-seven percent of districts have applied for planning money and 98.3 percent of the appropriated funds ($640,399 of $650,000) have been disbursed.

Comments

Given that districts received only 75 cents per student as a minimum of $500, and that there were extensive requirement and approval procedures, the strong participation of school districts is a positive indicator of widespread interest by educators.

SUBDIVISION 2 [Eligibility for Aid]

Requirement

Department of Education will provide application forms to districts by August 31, 1983.

Status

Application forms were sent to school districts on August 29, 1983.

Comments

The one-page application form was well-received by superintendents.

SUBDIVISION 3 [Aid for Planning]

Requirement

A school district that applies for aid to develop a technology plan shall receive 75 cents per student average daily membership (ADM) or a minimum of $500.

Status

Ninety-eight percent of the money has been disbursed.

Comments

First payment was metered but that problem was corrected.

SUBDIVISION 4 [Payment for Aid; Submission of Plans] see SUBDIVISION I

SUBDIVISION 5 [Contents of Plan Described]

Requirement

Five items required in law must be included in criteria and be evident in plans.

Status

Five items designated in law, plus the four adopted by the State Board, were included in criteria and were evident in technology plans approved by the Department.

SUBDIVISION 6 [Model Plans]

Requirement

The Department of Education, in consultation with the Advisory Committee, Educational Cooperative Service Units, Minnesota Educational Computing Corporation (MECC) and appropriate regional management information centers, shall develop model plans and criteria for evaluating district plans by August 31, 1983.

SUBDIVISION 7 [Approval of Plan]

Requirement

State Board shall approve or disapprove a plan within 60 days of receiving it from the district.

Status

The first group of plans were received in December. Those found meeting all criteria were approved by State Board of Education at its next board meeting. As of January 1st, 396 of the plans had been approved and another 21 had yet to be submitted.

SECTION 14 (129B.16) [INSERVICE TRAINING FOR USE OF TECHNOLOGY]

SUBDIVISIONS 1, 2, 3 [Eligibility for Aid, Applications, Amount of Aid]

Requirement

School districts may apply for state aid for the amount of $1 multiplied by ADM. Applications shall contain a specific inservice training proposal and shall have an approved technology utilization plan. Applications must be submitted by December 1, 1984, in the form and manner prescribed by the Department of Education. The Department shall approve or disapprove the plan within 60 days and make an aid payment within 30 days.

Status

Districts that had their technology utilization plans approved by the State Board of Education received applications for inservice funds. As of January 1st, 390 of the 434 districts had their inservice plans approved and had received the appropriate aid as defined in the law. Ninety-seven percent or $701,000 of the $716,000 has been, or is expected to be, paid to districts. However, because the law designated a deadline of December 1, 1984, $14,000 will be unclaimed and returned to the Treasury, unless reallocated by the Legislature. Three letters were sent to the 44 districts representing the smallest districts. Twenty-six did not send a plan and 18 chose not to participate.

SUBDIVISION 4 [Statewide Inservice Training]

Requirement

The Department shall provide for supplemental regional or statewide inservice training for district staff or technology use by June 30, 1985.

Status

These funds received tremendous leverage because they were used in conjunction with 25 professional organizations, departments, MECC and ECSU staff.

Nearly 8,000 educators have attended workshops partially or fully funded by these funds, and it is expected that well over 9,000 people will have benefited from inservice efforts. Equally important is the participation of the 25 professional organizations which allowed for assessment, involvement and ownership by classroom teachers and building administrators. Approximately 30 percent of the workshops concerned awareness or planning, while the remaining 70 percent concentrated on content-specific needs and courseware.

Comments

The professional organizations are pleased they are able to offer technology opportunities to their constituents. The more services professional organizations provide, the greater the opportunity for teachers to feel a sense of community with their colleagues.

SECTION 15 (129B.35) [REGIONAL COORDINATORS]

Requirement

The Minnesota Educational Computing Corporation shall provide regional instructional computing coordinators with expertise in the use of technology in education. The Minnesota Educational Computing Corporation and the Department of Education shall agree on the services to be provided by regional coordinators. Among other responsibilities, regional coordinators shall serve as onsite consultants to districts participating in technology utilization planning and inservice training.

Status

In the 1983-85 biennium, in cooperation with the Minnesota Department of Education, the Minnesota Educational Computing Corporation (MECC) provided services to school districts in technology utilization planning and inservice training. During the biennium, regional coordinators made over 900 site visits, held over 100 user meetings and made over 300 presentations.

Comments

Regional coordinators will be used extensively in future efforts to diffuse courseware purchased through courseware package duplication rights or volume purchases.

SECTION 16 (129B.20) [TECHNOLOGY DEMONSTRATION SITES] see the attached evaluation documents

SECTION 17 (129B.22) [COURSEWARE PACKAGE EVALUATION]

SUBDIVISION 1 [List]

Requirement

By January 1, 1984, the Department of Education shall compile, publish and distribute to districts a list of high quality courseware for use in public elementary and secondary schools.

Status

Three "High Quality Courseware" lists have been distributed, and a fourth one is ready for distribution.

Publication Date	Number of Programs
February, 1984	70
March, 1984	99
September, 1984	99
February, 1985	100

Comments

Currently, there are approximately 500 courseware packages somewhere in the evaluation process. Another courseware list will be distributed in the spring. One copy of the list is distributed to every public school building and media director and two copies go to each superintendent. In addition, Educational Cooperative Service Units (ECSUs) and a large number of private schools and colleges have asked to receive the courseware lists. National publicity about our courseware evaluation has been extensive. School districts in 35 states and three Canadian provinces have purchased copies of the documents from the Minnesota Curriculum Services Center. Several states have inquired about purchasing duplication rights. Legislation would have to be passed to make that possible.

SUBDIVISION 2 [Procurement]

Requirement

The Department shall obtain courseware packages for evaluation by notifying publishers and inviting them to submit their materials.

Status

The Department has been in contact with approximately 500 courseware producers and received more than 1500 courseware packages ranging in value from $9.95 to $3300.

Comments

Additional producers are in contact with the Department regarding submittal of their programs for review. Thus, courseware packages in ever-widening curricular areas are being received. Also, producers who originally submitted programs are routinely sending their new programs for review.

SUBDIVISION 3 [Criteria]

Requirement

The State Board shall develop and adopt criteria and procedures for evaluating courseware packages, in consultation with the Department, advisory committee, appropriate regional management information centers and MECC.

Status

The State Board adopted procedures and criteria to evaluate instructional courseware at its meeting on September 13, 1983. The Board adopted criteria to evaluate test making, teacher utility, counseling and library cataloging programs at its meeting on November 14, 1984.

Comments

There have been numerous requests for criteria from other states.

SUBDIVISION 4 [Consultants]

Requirement

The Department may employ consultants to evaluate courseware packages and pay them fees based on the size and complexity of the courseware packages involved.

Status

The Department employed teams of consultants to conduct initial screening of courseware packages before they were field tested. These consultants represented teachers' organizations, as well as subject-area groups.

Comments

Teachers believe participation in this activity provides great inservice and learning opportunities.

SUBDIVISION 5

Requirement

The evaluation team for each courseware package shall include at least five persons. Among them will be three practicing teachers from appropriate grade level or content areas who will field-test the courseware packages in their classrooms, one microcomputer professional knowledgeable in software and documentation techniques and one curriculum content expert from the Department.

Status

Over 1000 Minnesota teachers and technology professionals have helped evaluate courseware.

Comments

Teachers and technicians receive a small stipend to compensate them for helping evaluate courseware.

SUBDIVISION 6 [High Quality]

Requirement

Based on the reports submitted by evaluation team members and the criteria and procedures adopted by the State Board, the Department shall determine whether the courseware package qualifies as high quality.

Status

High quality courseware packages are identified by averaging reviewer's scores and applying weight factors.

Comments

Evaluative data obtained from Minnesota educators is routinely compared with information gathered from other agencies and journals and consistently found to be similar.

SUBDIVISION 7 [Disposition]

Requirement

The Department shall maintain a collection of the courseware packages evaluated as high quality.

Status

All courseware received is in the field being evaluated, or shelved in a library at Capitol Square.

Comments

Space is a critical problem. At the rate courseware is being donated for review, there will not be room to shelve it. The "High Quality Courseware" collection is being used in three ways:

1. Districts are sending teachers to the Department to preview materials before purchasing courseware.

2. Districts and ECSUs are requesting that large numbers of the collection be brought to their inservice sessions for educators to examine.

3. State Department staff uses portions of the collection in their inservice sessions as a means of encouraging teachers to increase their microcomputer use.

There is no space and limited hardware available for school staff to review the courseware collection. The requested courseware integration centers are extremely important to the next stage of implementation.

Status

With the assistance of 31 technology planning experts divided into three teams, criteria and a document titled "Planning for Educational Technology" were developed. The Minnesota Department of Education also conducted 15 workshops throughout the state to assist school districts in developing plans. Between 29 and 110 people attended each of the 15 workshops.

Comments

"Planning for Educational Technology" has been praised by national and state authorities. The most serious criticism of the document was that it offered too many optional plans for districts.

SECTION 18 (129B.23) [SUBSIDY FOR PURCHASE OF COURSEWARE PACKAGES]

SUBDIVISION 1 [Aid Amount]

Requirement

State aid shall be given to districts that purchase or lease courseware packages that qualify as high quality according to section 17 of this article.

Status

No action.

SUBDIVISION 2 [Aid Payment]

Requirement

Applications for aid shall be submitted in the form and manner prescribed by the Department.

Status

Last year, because there was a limited amount of courseware evaluated, districts were encouraged to delay submission of requests for reimbursement. As of September 25, 1984, twenty-seven districts had purchased 409 courseware packages for $20,005.22 and were reimbursed $4920.86.

Comment

Many districts have submitted requests for reimbursement since September. As the number of programs evaluated "high quality" increases, the requests for reimbursement will increase as well.

SECTION 19 (129B.24) [PURCHASE OF COURSEWARE DUPLICATION RIGHTS]

Requirements

Rights to duplication of courseware packages may be purchased and volume purchase agreements may be established by the Department of Education, if the Department determines that the courseware packages qualify as high quality and if the courseware packages are available to the state at a lower cost than if purchased by school districts individually.

Status

The $225,000 appropriation allocated for duplication rights and volume purchases allowed the Department to purchase or lease duplication rights to over seventy video titles. In the past six months alone, over 2500 video tapes were duplicated for school districts by the Department and unknown thousands have been copied from public broadcast stations or districts themselves. Computer courseware purchases required extensive evaluation.

Three major packages have been purchased with full duplication rights, and two packages have been selected for volume purchases. Each of the programs has 15-100 disks. Most of these computer packages will become available between March and June.

Comments

The savings that can be accrued from state purchases is amazing. Volume purchases usually result in savings of 33 to 50% per package. Even more remarkable are consortium packages developed or purchased in conjunction with other states, which are often purchased for less than 10% of their market value.

SECTION 20 (129B.40) [COURSEWARE PACKAGE DEVELOPMENT]

SUBDIVISION 1 [New Courseware Packages]

Requirement

The Minnesota Educational Computing Corporation (MECC), in consultation with the Department of Education, is authorized to develop and design courseware packages which will meet the needs of school districts and which are otherwise unavailable or too expensive for individual districts or the state to purchase.

The Department of Education shall evaluate whether the courseware packages qualify as high quality according to the criteria and procedures established in section 129B.37.

Courseware packages developed according to this subdivision shall become the property of MECC. Revenue from the sale of their courseware packages shall be used to develop additional courseware packages according to this secion.

Results

MECC has produced 12 courseware packages and a comprehensive Curriculum Guide as part of a series titled "Computing and Information." Each package consists of an Apple computer disk and a teacher's manual. The curriculum guide is designed to aid teachers who wish to use the packages as a course about information and computers.

A survey was conducted of Minnesota school's needs for computer materials. The results indicated a high interest in database materials for social studies classrooms and writing tools for language arts classrooms. Working with the Minnesota Department of Education, MECC formulated a plan to build on these needs and expand them into an approach to the overall problem of preparing children for the information age.

"Computing and Information" is broken down into three parts: "Composing with Information," "Accessing Information" and "Evaluating Information." Tools and instructional materials take children from an introduction to the computer keyboard through word processing to graphing data and on into database construction and access techniques. The series culminates with a student project in which all tools are used to research and report on a problem.

Comments

MECC's development staff designed all of the packages. The majority of the programming and preparation of teacher support materials were also undertaken by MECC. Four Minnesota-based software developers (EduSystems, ITDA, Discourse and Convergent Systems) worked under contract to write selected software and teacher's manuals. A license was established with the TIES organization to allow MECC to distribute a keyboarding package which they had under development to all Minnesota schools.

Over 40 Minnesota school districts participated in the design and testing of the packages. Teachers served as members of design groups and pilot-tested the products in their classrooms.

MECC COMPUTING AND INFORMATION SERIES

	PRODUCT	GRADE RANGE								
		4	5	6	7	8	9	10	11	12
COMPOSING INFORMATION	Elementary Keyboarding (No. A-130) —teaches typing techniques	x	x	x						
	On Target (No. A-131) —builds typing speed and accuracy	x	x	x	x	x	x			
	MECC Writer (No. A-132) —introduces the basics of word processing			x	x	x	x	x	x	x
	The Write Start (No. A-133) —encourages creativity with word processing			x	x	x	x	x		
	MECC Speller (No. A-134) —identifies and corrects misspelled words				x	x	x	x		
	MECC Editor (No. A-135) —guides students through the writing process				x	x	x	x		
	Graphing Concepts (No. A-136) —introduces graph construction and analysis				x	x	x			
	MECC Graph (No. A-137) —produces graphs with student-supplied data				x	x	x	x	x	x
ACCESSING INFORMATION	Stuff and Fetch (No. A-138) —encourages good database organization				x	x	x			
	Trivia Machine (No. A-139) —enables students to perform key word searches to answer rock-and-roll trivia questions				x	x	x			
	Presidential Dataquest (No. A-140) —allows students to formulate and answer questions about the U.S. Presidents				x	x	x	x	x	x
EVALUATING INFORMATION	Station Manager: MECC-FM (No. A-141) —enables students to use information-processing tools to complete a research project				x	x	x	x	x	x
	Computing and Information: Teacher's Guide (No. A-142) — shows how the above products relate to each other and how teachers can use them as part of a course on information processing or computer literacy									